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INTRODUCTION

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AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Materiel Command, DCS/Science Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

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Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

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Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

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Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

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Abstract - A brief summary describing the research of the report.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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Thermodynamic and Stochastic Theory of Electrical Circuits.
AD-A264748 REPORT DATE: 15 FEB 92 FINAL REPORT

Tin-Sulfur and Tin-Selenium Phenylated Ring Systems as Organometallic Precursors in Tin Sulfide and Tin Selenide.
AD-A265738 REPORT DATE: 92 FINAL REPORT

Topical Meeting of Broadband Analog and Digital Optoelectronics.
AD-A264843 REPORT DATE: 92 FINAL REPORT

A TR ESR Study of the Quenching of Photoexcited Dioxouranium (VI) Salts by Stable Nitroxyl Free Radicals.
AD-A264314 REPORT DATE: 93 FINAL REPORT

Transition Metal Coordination Compounds: Solvated and Unsolvated Anhydrous Metal Chlorides from Metal Chloride Hydrates
MCln xH2O + 2x(CH3)3SiCl - MCln + xC H3Si2O + 2xHCl.
AD-A265744 REPORT DATE: 92 ANNUAL REPORT

Transition State Spectroscopy of Bimolecular Chemical Reactions.
AD-A264249 REPORT DATE: 92 FINAL REPORT

Transition-State Spectroscopy via Negative Ion Photodetachment.
AD-A264247 REPORT DATE: 93 FINAL REPORT

Transition-State Spectroscopy via Negative Ion Photodetachment.
AD-A266121 REPORT DATE: 93 ANNUAL REPORT

Trityl Tetrakis(3,5-bis(trifluoromethyl)phenyl)-Borate: A New Hydride Abstraction Reagent.
AD-A265717 REPORT DATE: 92 FINAL REPORT

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Two Temperature Modeling and Experimental Measurements of Laser Sustained Hydrogen Plasmas.
AD-A285750 REPORT DATE: 01 MAY 93 ANNUAL REPORT

Ultrafast, Passive, Broad-Band, Optical Shutter Based on Novel Semiconductor/Conducting Polymer Interfaces.
AD-A284098 REPORT DATE: 18 DEC 92 FINAL REPORT

Ultrasonic Wave Interaction with Advanced Complex Materials for Nondestructive Evaluation Applications.
AD-A285704 REPORT DATE: 15 DEC 92 FINAL REPORT

Unsteady Flow Past a NACA 0012 Airfoil Pitching at Constant Rates.
AD-A285159 REPORT DATE: 13 APR 93 FINAL REPORT

USU Center of Excellence in Theory and Analysis of the Geo-Plasma Environment.
AD-A284750 REPORT DATE: 17 FEB 93 FINAL REPORT

U.S. National Weather Experiment STORM-FEST 1992: Wave and Turbulence in Frontal Zones.
AJ-A284284 REPORT DATE: 01 DEC 92 ANNUAL REPORT

Velocity Relaxation of S(1D) by Rare Gases Measured by Doppler Spectroscopy.
AD-A282441 REPORT DATE: 01 DEC 92 FINAL REPORT

Visual Encoding of Spatial Relations.
AD-A286049 REPORT DATE: 28 MAY 93 ANNUAL REPORT

Visual Psychophysics of Egomotion.
AD-A285253 REPORT DATE: 02 MAR 93 FINAL REPORT

Wavelength Effects in the Photolysis of Ketones: Stereoisomerization and Magnetic Isotope 13(C)/12(C) Separation. A Probe for Adiabatic vs. Diabatic Trajectories during Bond Dissociation.
AD-A282454 REPORT DATE: 93 FINAL REPORT

Wavelet Local Extrema Applied to Image Processing.
AD-A282382 REPORT DATE: DEC 92 FINAL REPORT

Wide Band-Gap Semiconductors. 1991 Materials Research Society Symposium Proceedings.
AD-A283418 REPORT DATE: 14 SEP 92 FINAL REPORT

Width of Particle Beams Desorbed in Electron Stimulated Desorption: O(+) and Metastable CO from CO/Pt(111).
AD-A282456 REPORT DATE: 01 JAN 93 FINAL REPORT

Workshop on the Road to Room Temperature Superconductivity.
AD-A284633 REPORT DATE: 14 JAN 93 FINAL REPORT

Wound Healing and Connective Tissue Metabolism: The Role of Hyperbaric Oxygen Therapy.
AD-A282483 REPORT DATE: JUN 92 FINAL REPORT

Xenobiotic Kinetics and Toxicity Among Fish and Mammals.
AD-A284346 REPORT DATE: 31 MAR 93 FINAL REPORT

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X-Ray Absorption Spectroscopy of Electrochemically Generated Species,
AD-A284749 REPORT DATE: 19 FEB 93 FINAL REPORT

The 12 UM Contribution of Nearby Galaxies to the Infrared Background.
AD-A284338 REPORT DATE: APR 93 ANNUAL REPORT

The 1991 Neural Information Processing Systems-natural & Synthetic.
AD-A284754 REPORT DATE: 04 FEB 93 FINAL REPORT

4D Interconnect Experimental Development.
AD-A284288 REPORT DATE: 28 JUN 93 FINAL REPORT

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ABSTRACTS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-B173 190L 7/6 7/3 11/8

DURHAM UNIV (UNITED KINGDOM) DEPT OF CHEMISTRY

(U) New Perfluoropolyethers as Potential Lubricants.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-31 Aug 91,

NOV 92 47P

PERSONAL AUTHORS: Chambers, Richard D.; Joel, Andrew K.;
West, Michael W.

CONTRACT NO. AFOSR-87-0324

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0341, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by
AFOSR/NC, Bolling AFB, DC 20332-5260; 18 May 93 or higher
DoD authority.

DESCRIPTORS: (U) *LUBRICANTS, *POLYETHERS, *POLYMERS,
FLUORINATION, SYNTHESIS(CHEMISTRY), CHEMICAL REACTIONS,
ORGANIC CHEMISTRY, PHYSICAL PROPERTIES, CHEMICAL
PROPERTIES.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2, Ether/
perfluoropoly, Glycol/polyethylene, Propene/hexafluoro.

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AD-B172 201 24/1 24/4 24/3 12/5

UTAH WATER RESEARCH LAB LOGAN

(U) Environmental Containment Property Estimation Using
QSARS In An Expert System.

DESCRIPTIVE NOTE: Final rept. 18 Aug 89-15 Aug 92.

JAN 93 72P

PERSONAL AUTHORS: Doucette, William J.; Holt, Mark K.;
Denne, Doug

CONTRACT NO. AFOSR-89-0509

MONITOR: AFOSR, XC
TR-93-0175, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A microcomputer based Property Estimation
Program (PEP), utilizing MCI-property, TSA-property and
property-property correlations and UNIFAC derived
activity coefficients, was developed to provide both
experts and non-experts with a fast, economical method to
estimate a compound's S, Kov, Pv, Koc, H, and BCF for use
in environmental fate modeling.

DESCRIPTORS: (U) *ESTIMATES, *EXPERT SYSTEMS,
*MICROCOMPUTERS, *ENVIRONMENTAL IMPACT, *ORGANIC
COMPOUNDS, COEFFICIENTS, CORRELATION, MATHEMATICAL MODELS,
AIR FORCE RESEARCH.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A4, MCI Property
correlation, TSA Property correlation, Property property
correlations, PEP(Property Estimation Programs),
UNIFAC(UNIQUAC Functional Group Activity Coefficient),
Aqueous solubility, KOW(Octanol/Water Partition
Coefficient), KOC(Organic Carbon Normalized Soil/Water
Sorption Coefficient), Vapor pressure, Henrys law
constant, BCF(Bioconcentration factor), Environmental
fate modeling, TSA(Total Molecular Surface Area),
MCI(Molecular Connectivity Indices), *Environmental
Impact assessment.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA RESEARCH
AND DEVELOPMENT DIV

(U) Refractory Metal Beryllides for Aerospace Applications.

DESCRIPTIVE NOTE: Final rept. 1 Mar 91-31 Dec 92,

FEB 93

98P

PERSONAL AUTHORS: Chou, T. C.; Nieh, T. G.; Wadsworth, J.

REPORT NO. LMSC-P059900

CONTRACT NO. F49620-91-C-0024

PROJECT NO. 2308

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0170, AFOSR

UNCLASSIFIED REPORT

Distribution authorized to U.S. Government agencies only;
Test and Evaluation; 1 Apr 93. Other requests shall be
referred to the Air Force Office of Scientific Research,
Boiling AFB, Washington, D.C. 20332.

ABSTRACT: (U) This technical report summarizes
experimental results in five major areas: powder
metallurgy (PM) processing, mechanical alloying, pest
reaction and oxidation behavior, structural stability,
and creep property of refractory metal beryllides,
particularly the niobium beryllide, Nb₂Be₁₇. A three-step
PM process was developed to fabricate single-phase
Nb₂Be₁₇. Mechanical alloying of elemental Nb and Be
powders, based on 1:12 and 2:17 atomic ratios, was
demonstrated to result in amorphous which could be
transformed into homogeneous Nb₂Be₁₇ and NbBe₁₂ compounds
by subsequent vacuum annealing. The study of pm
phenomenon of refractory-metal beryllides by oxidation
revealed that ZrBe₁₃ exhibited complete disintegration at
intermediate temperatures, while Nb₂Be₁₇ only showed very
slight disintegration. Nb₂Be₁₇ was found vulnerable to
thermal cracking at temperatures between 800 and 1000 deg
C, and exhibited poor oxidation resistance above 800 deg
C. Mechanical ball milling of Nb₂Be₁₇ resulted in an

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amorphous state which cannot be restored to its original
crystal structure after vacuum annealing. In the area of
high-temperature mechanical properties, fracture
toughness and hot-hardness test results indicated Lft
although the material was brittle at low temperatures. It
became plastic at elevated temperatures (> 1000 deg C).
High-temperature creep study of Nb₂Be₁₇ showed that the
stress exponent was about 3, and the activation energy
was about 575 kJ/mol. The creep of Nb₂Be₁₇ at high
temperatures is apparently controlled by a dislocation
glide mechanism.

DESCRIPTORS: (U) *POWDER METALLURGY, *REFRACTORY METALS,
*NIOBIUM ALLOYS, ACTIVATION ENERGY, ANNEALING, BERYLLIDES,
CREEP, CRYSTAL STRUCTURE, CRYSTALLIZATION, DISINTEGRATION,
HARDNESS, HIGH TEMPERATURE, MECHANICAL PROPERTIES,
OXIDATION RESISTANCE, PLASTICS, STRUCTURES, TEMPERATURE,
TEST AND EVALUATION, TOUGHNESS, VACUUM, STRUCTURAL
PROPERTIES, STRUCTURAL ANALYSIS, CRACKING(FRACTURING),
THERMAL STRESSES, THERMAL STABILITY, BRITTLENESS.

IDENTIFIERS: (U) Nb, Be, NbBe₁₂, Nb₂Be₁₇, ZrBe₁₃, B 1 5,
1 Alloying, amorphization, Crystallization, Oxidation,
pest reaction, Ball milling, Hot hardness, Fracture
toughness, High temperature creep, Sum exponent,
Activation energy, PEG1102F, WUAFOSR2306AS, Niobium
beryllides, Specific strength.

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WASHINGTON STATE UNIV PULLMAN DEPT OF PSYCHOLOGY

GRANTS, METHODOLOGY, PROBES, READING, RECALL.

(U) Augmentation of Research on Cognitive Control.

IDENTIFIERS: (U) PE81103D, WUAFOSR3348454, Working memory, Text comprehension, Individual difference, AASERT Grant, Expository information

DESCRIPTIVE NOTE: Annual rept. 1 May 92-30 Apr 93.

MAY 93

8P

PERSONAL AUTHORS: Whitney, Paul

CONTRACT NO. F49620-92-J-0243

PROJECT NO. 3484

TASK NO. S4

MONITOR: AFOSR, XC
TR-93-0421, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Results from the first year of the AASERT grant showed that readers high and low in working memory (WM) capacity read expository text in qualitatively different ways, and this resulted in the groups learning different information from the same text. In the first experiment, a probe deadline methodology sampled the contents of WM during the reading of expository passages. The lag between the presentation of expository information and the presentation of a probe question about that information was varied. The questions tested the reader's ability to recall detail or topic information. Subjects performed similarly on the topic probe questions. However, subjects low in WM capacity answered fewer detail probe questions correctly than those high in WM capacity. In the second experiment, subjects read the passages without topic sentences, and answered thematic and detail questions about them. Reading times for identical sentences in a topic absent and topic present conditions and subjects' accuracy in answering detail and topic questions were compared. Subjects performed similarly in the topic present condition, but subjects low in WM capacity answered fewer detail questions correctly in the topic absent condition. ... Working memory, Text comprehension, Individual differences

DESCRIPTORS: (U) *COMPREHENSION, *LEARNING, ACCURACY.

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CALIFORNIA UNIV BERKELEY

CYANATES, ANIONS, METAL COMPLEXES, FREE RADICALS, VIBRATIONAL SPECTRA, SPECTROSCOPY, REPRINTS.

(U) Photoelectron Spectroscopy of CN^- , WCO^- , and NCS^- .

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303ES, Electron binding energy, Cyanate/ISO, Cynate/Isothio, Pseudohalides.

JUN 93 12P

PERSONAL AUTHORS: Bradforth, Stephen E.; Kim, Eun H.; Arnold, Don W.; Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

PROJECT NO. 2302

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0407, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n2 p800-810, 15 Jan 93. Available only to DTIC user. No copies furnished by NTIS.

ABSTRACT: (U) The 268 nm photoelectron spectra of CN^- , and NCO^- have been recorded with a pulsed time-of-flight photoelectron spectrometer. The photoelectron spectrum of CN^- has also been recorded at 213 nm revealing transitions to the $SG(A)$ state as well as the ground $Sq(x)$ Sigma Sup (+) state of the CN radical. The following adiabatic electron affinities (EAs) are determined: $EA(CN) = 3.882 \pm 0.004$ eV, $EA(NCO) = 3.808 \pm 0.005$ eV, and $EA(NCS) = 3.537 \pm 0.005$ eV. The adiabatic electron affinity of cyanide is in disagreement with the currently accepted literature value. Our measurement of the electron affinity of NCS confirms recent theoretical estimates that dispute the literature value. By Frank-Condon analysis of vibrational progressions observed in each spectrum, the change in bond length between anion and neutral are also determined. NCO^- this yields $R_{Sub O}(C-N) = 1.17 \pm 0.01$ A and $R_{Sub O}(C-O) = 1.28 \pm 0.01$ A, and for CN^- the equilibrium bond length is found to be $R_{Sub e}(C-N) = 1.77 \pm 0.004$ A. The gas phase fundamental for CN^- is determined for the first time: $\nu = 2035 \pm 40$ cm⁻¹.

DESCRIPTORS: (U) *PHOTOELECTRON SPECTRA, *CYANIDES,

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CALIFORNIA UNIV BERKELEY

CALIFORNIA UNIV BERKELEY

(U) Anion Photoelectron Spectroscopy of Iodine-Carbon Dioxide Clusters.

(U) Transition-State Spectroscopy via Negative Ion Photodetachment,

DEC 92 5P

83 8P

PERSONAL AUTHORS: Arnold, Don W.; Bradforth, Stephen E.; Kim, Eun H.; Neumark, Daniel M.

PERSONAL AUTHORS: Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

CONTRACT NO. AFOSR-91-0084

MONITOR: AFOSR, XC
TR-93-0410, AFOSR

UNCLASSIFIED REPORT

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0411, AFOSR

Availability: Pub. in Jnl. of Chemical Physics, n97 v12, p9468-9471, 15 Dec 93.

ABSTRACT: (U) Anion photoelectron spectroscopy has proved to be a powerful method for the study of molecular clusters because it combines mass-selectivity and reasonable spectral resolution. Anion photoelectron spectra have been reported for elemental and molecular clusters of the type A⁽⁻⁾(sub n) in which the additional electron is delocalized over the entire anion cluster, and for mixed clusters of the type X⁽⁻⁾(M)(sub n) in which a distinct X⁽⁻⁾ chromophore interacts with a 'solvating' species, M. The X⁽⁻⁾(M)(sub n) photoelectron spectra obtained thus far have exhibited the same vibrational and electronic features seen in the bare X⁽⁻⁾ spectrum, although these features are typically shifted and broadened in the cluster anion spectra due to the X⁽⁻⁾/M interaction. (Author)

DESCRIPTORS: (U) *PHOTOELECTRON SPECTRA, *ANIONS, *IODINE, *CARBON DIOXIDE, REPRINTS, MOLECULAR STRUCTURE, RESOLUTION, CHROMOPHORES, VIBRATION, ELECTRONICS, SOLVATION, INTERACTIONS, SOLUTES, NUCLEAR PHYSICS, ELEMENTARY PARTICLES.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303ES, *Clusters, Mass selectivity

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Availability: Pub. in Accounts of Chemical Research, v26 p33-39 1993.

ABSTRACT: (U) One of the most ambitious goals in the field of reaction dynamics is to be able to construct the complete potential energy surface for a chemical reaction. Given such a surface, one can, in principle, calculate all attributes of the reaction, down to the most detailed state-to-state cross section. Thus, in recent years, an array of experimental and theoretical methods has been developed with the goal of extracting chemically accurate potential energy surfaces for reactions. This is a daunting problem; at present, the H + H₂ reaction is the only system for which such a surface is available. However, while the construction of a full potential energy surface is certainly desirable, it seems more reasonable to concentrate on the regions of the surface that play the largest role in determining the dynamics of a chemical reaction. (Author)

DESCRIPTORS: (U) *TRANSITIONS, *SPECTROSCOPY, *ELECTRONIC STATES, *POTENTIAL ENERGY, *SURFACES, REPRINTS, IONS, CHEMICAL REACTIONS, DYNAMICS, CROSS SECTIONS, ELECTRON TRANSITIONS, PHASE TRANSFORMATIONS, CONSTRUCTION, ABSORPTION, PHOTONS, ATOMS, MOLECULES, NUCLEAR PHYSICS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303ES.

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*Photodetachment, *Negative ions

AD-A268 115 6/13 24/3 24/7

MEHARRY MEDICAL COLL NASHVILLE TN

(U) Biotransformation of Toxic Metals by Bacteria.

DESCRIPTIVE NOTE: Annual rept. 1 May 92-30 Apr 93.

MAY 93 5P

PERSONAL AUTHORS: Blake, Robert, II

CONTRACT NO. F49820-92-J-0246

PROJECT NO. 2300

TASK NO. HS

MONITOR: AFOSR, XC
TR-93-0419, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of this research are to study each of the various molecular mechanisms whereby toxic metal cations and oxyanions are chemically transformed by bacteria that live in the soil. The research effort for the current year has focused on the Xanthomonas-dependent transformations of selenium and lead. Conversion of selenite and ionic lead into insoluble biocolloids was found to occur widely in the genus Xanthomonas. The resulting biocolloids were shown to bear negative charges derived from biological polymers associated with the metals in the colloid. The formation of a lead biocolloid was accomplished from a lead-citrate complex where citrate was the sole carbon source for the bacterium. These observations could prove useful for the eventual exploitation of Xanthomonas and related genera for the removal of toxic wastes from selected, heavily polluted sites

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *SELENIUM, *SOIL MECHANICS, *SOIL STRUCTURE INTERACTIONS, *LEAD(METAL), *POLYMERS, WASTE TREATMENT, INDUSTRIES, WASTES, COLLOIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2300HS, *Xanthomonas, Ionic lead, Biocolloids, Bioremediation

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ILLINOIS UNIV AT URBANA DEPT OF CELL AND STRUCTURAL BIOLOGY

SCN(Suprachiasmatic Nucleus).

(U) The Organization of the Suprachiasmatic Circadian Pacemaker of the Rat and Its Regulation by Neurotransmitters and Modulators.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 90-31 Mar 93.

MAY 93 18P

PERSONAL AUTHORS: Gillette, Martha U.; DeMarco, Steven J.; Ding, Jian M.; Gallman, Eve A.; Falman, Lia E.

CONTRACT NO. AFOSR-90-0205

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0423, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The long-term goal of these studies is to understand how cells of the suprachiasmatic nucleus (SCN) are organized to form a 24-h biological clock and what roles specific neurotransmitters and modulators play in timekeeping and resetting processes. We address these questions by assessing the pattern of spontaneous neuronal activity using extracellular and whole cell patch recording techniques in long-lived SCN brain slices from rats. We have observed that a robust pacemaker persists in the ventrolateral region of microdissected SCN and have begun to define the electrophysiological properties of neurons in this region. Further, we are investigating changing sensitivities of the SCN to resetting by exogenous neurotransmitters, such as glutamate, serotonin and neuropeptide Y, across the circadian cycle. Our findings emphasize the complexity of organization and control of mammalian circadian timing

DESCRIPTORS: (U) *BRAIN, CIRCADIAN RHYTHMS, NEUROTRANSMITTERS, MODULATORS, RATS, LABORATORY ANIMALS, TIME INTERVALS, IN VITRO ANALYSIS, MEDICAL RESEARCH.

IDENTIFIERS: (U) PE81102F, WUAFOSR3484A4.

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FOSTER-MILLER INC WALTHAM MA RATE, HOLOGRAMS, PROTOTYPES, PARALLEL PROCESSORS.

(U) Holographic Multiplexing for 3D Optical Memory.

DESCRIPTIVE NOTE: Final rept..

JUN 93 28P

PERSONAL AUTHORS: Domash, V. R.

REPORT NO. AFB-0077-FM-9566-824

CONTRACT NO. F49820-92-C-0077

MONITOR: AFOSR, XC
TR-93-0414, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The increasing demand for larger memory capacity has led to the exploration of volume data storage in optical materials with theoretical capacities of 10 to the 13th power bits/cm cubed. However, an important technical barrier is the design of an input/output architecture to read and write to the optical 3D memory at very high speed. During Phase I of this effort, we have experimentally demonstrated the operation of a unique optical lock-in instrument that can play a key role in accessing optical memories at high data rates. This optical lock-in detector is capable of demultiplexing a highly complex wavefront consisting of a number of holograms that have been combined on a single light beam. Using the optical lock-in detector, it is possible to demultiplex and recover any individual hologram using optical mixing in a photorefractive medium with the appropriate modulation applied to the reference optical beam. For Phase II a prototype optical memory system is proposed, including highly parallel input/output techniques, a cache memory for faster access, and a unique photorefractive material for optical data storage. At least one key component of this optical memory system, an optical beamlet array generator, is a likely candidate for Phase III development by Foster-Miller and Polaroid Corporation

DESCRIPTORS: (U) *OPTICAL STORAGE, *MULTIPLEXING, *HOLOGRAPHY, *OPTICAL DATA, THREE DIMENSIONAL, COMPUTER ARCHITECTURE, INPUT OUTPUT PROCESSING, DATA RATE, HIGH

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AD-A268 093 CONTINUED

SOUTHEASTERN OKLAHOMA STATE UNIV DURANT DEPT OF PHYSICAL SCIENCES

(U) NMR Characterization of Polymers Formed in Diazotizing Mixtures of Luminol and 3-Amino-L-tyrosine.

DESCRIPTIVE NOTE: Final rept. 1 Apr 92-31 Mar 93.

MAY 93 52P

PERSONAL AUTHORS: Wright, John R.

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0418, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A melanin-like polymer was prepared by diazotizing luminol (5-amino-2,3-dihydro-1, 4-phthalazinedione) and 3-amino-L-tyrosine in a mixed water/dimethylsulfoxide solvent; this was followed by acetone precipitation and aging of the solid residue for a month (the polymer forms slowly in the solid residue). An aqueous solution containing 0.50 F NaOH, 0.0011 M luminol, 0.010 F potassium formate and the polymer at a concentration of 0.050 mg/mL was observed to undergo an instantaneous seven-fold increase of chemiluminescence when the solution was subjected to a 0.5 Watt/mL irradiation with 20 kHz acoustic energy. This sonochemiluminescent property suggests that earlier reports of strobos of luminescence induced by pulsed microwave irradiations of aqueous solutions of the polymer might have an origin in the microwave acoustic effect. Since the sonochemiluminescent effect is marked and easily detected, the polymer may be applicable as a dosimeter for studying acoustic effects in pulsed, high-powered microwave irradiations, especially where the target geometry is complex. Further insight into the observed properties will depend on a characterization of the structure of the polymer, which is currently not known. Attempts at a structural characterization have been hampered thus far by a lack of suitable polymer fragments, i.e., a reliable means for fragmenting the polymer or limiting its DPn has not been found.

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DESCRIPTORS: (U) *POLYMERS, *TYROSINE, *NUCLEAR MAGNETIC RESONANCE, ACETONES, ACOUSTICS, CHEMILUMINESCENCE, DOSIMETERS, ENERGY, FORMATES, FRAGMENTS, GEOMETRY, IRRADIATION, MELANIN, MICROWAVES, POTASSIUM, PRECIPITATION, RESIDUES, SOLIDS, SOLVENTS, STRUCTURES, TARGETS, WATER, DIAZO COMPOUNDS, AGING(MATERIALS), PULSES, AMINES, MOLECULAR STRUCTURE.

IDENTIFIERS: (U) PE81102F, WJAFOSR2312AS, *Diazotizing, *Luminol, 3-Amino-L-tyrosine, Dimethylsulfoxide, Sono chemiluminescence, DALM(Diazoluminomelanin)

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NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF PSYCHOLOGY

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Visual Encoding of Spatial Relations.

(U) Quantum Yields for OH Production From 193 nm and 248 nm Photolysis of HNO₃ and H₂O₂.

DESCRIPTIVE NOTE: Annual rept..

MAY 93 40P

MAY 93 13P

PERSONAL AUTHORS: Burbeck, Christina A.

PERSONAL AUTHORS: Schliffmann, A.; Nelson, D. D., Jr.; Nesbitt, D. J.

CONTRACT NO. F49620-92-J-0114

CONTRACT NO. AFOSR-90-0055

MONITOR: AFOSR, XC
TR-93-0420, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Psychophysical studies of the processes underlying spatial localization and their relationship to both lower and higher level processing were conducted. The spatial extent of position integration areas was measured and found to be adequate to account for the increase in separation discrimination thresholds with separation. The influence of the spatial frequency of embedded targets was investigated and found to be insignificant, as it had previously been found to be for isolated targets. The relationship between separation discrimination and object formation was investigated. A model of the process of object formation developed. Studies on how area is encoded were conducted and related to the model of object formation... Human vision, Visual psychophysics, Visual spatial localization, Position

DESCRIPTORS: (U) *PSYCHOPHYSICS, *VISUAL PERCEPTION, *SPATIAL DISTRIBUTION, DISCRIMINATION, FREQUENCY, HUMANS, INTEGRATION, MODELS, PROCESSING, SEPARATION, TARGETS, VISION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313AS.

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0389, AFOSR

PROJECT NO. 2303

TASK NO. B1

Availability: Pub. in Jnl. Chemical Physics, v98 n9 p8935-6946, 1 May 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The absolute quantum yield phi for OH production from 193 nm and 248 nm photolysis of HNO₃ and H₂O₂ are measured at room temperature using flash kinetic spectroscopy in a flow tube. The OH radicals are produced by excimer laser photolysis and are probed via direct absorption of high resolution, tunable IR laser light

DESCRIPTORS: (U) *NITRIC ACID, *HYDROGEN PEROXIDE, *PHOTOLYSIS, REPRINTS, HYDROXIDES, PRODUCTION, HYDROXYL RADICALS, PHOTONS, ABSORPTION, VIBRATION, ROTATION, PRECURSORS, HIGH RESOLUTION, INFRARED SPECTROSCOPY, KINETICS, EXCIMER LASERS, TUNABLE LASERS, LIGHT.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, *Quantum yields, Meinel.

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AD-A265 816

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SEARCH CONTROL NO. T4155F

AD-A265 764 22/1

AD-A265 763 7/3

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT
OF ENGINEERING SCIEN CE AND MECHANICS

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Control of Large Space Structures with Varying
Configuration.

(U) Organometallic Processes Promoted by Ultrasound.

DESCRIPTIVE NOTE: Final rept. 15 Apr.89-31 Aug 92.

PERSONAL AUTHORS: Boudjouk, Philip

MAR 93 9P

APR 93 8P

PERSONAL AUTHORS: Melrovitch, Leonard

CONTRACT NO. AFOSR-91-0187

PROJECT NO. 2303

CONTRACT NO. F49620-89-C-0045

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0387, AFOSR

MONITOR: AFOSR, XC
TR-93-0378, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The research has produced significant advances in the state of the art on the following subjects: (1) A mathematical formulation for the maneuvering and control of flexible articulated multibody systems. (2) A theory for the modeling of flexible multibody structures. (3) A perturbation theory for the maneuvering and control of articulated flexible multibody systems.... Maneuvering and control of articulated multibody systems, Modeling of flexible multibody systems, Perturbation theory for maneuvering and control.

DESCRIPTORS: (U) *STATE OF THE ART, *MANEUVERABILITY,
*FLEXIBLE STRUCTURES, *SPACE SYSTEMS, CONTROL,
FORMULATIONS, PERTURBATION THEORY, PERTURBATIONS, THEORY.

IDENTIFIERS: (U) *Military Structures.

Availability: Pub. in Current Trends in Sonochemistry, p111-120 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) I want to thank Royal Society of Chemistry and particularly Gareth Price, the organizer of this symposium, for inviting me to sunny Manchester and giving me this opportunity to present some of our recent results on the effects of ultrasound on heterogeneous reactions. Our speciality is organosilicon chemistry and the work you will see here reflects that focus. This paper is divided into two sections: I. Stoichiometric Reactions of Group I Metals with Halosilanes, in which our studies of the reactions of dihalosilanes and alkali metals are presented; and II. Transition Metal Catalyzed Reactions of Silanes, which summarizes our results on the reactions of hydrosilanes with platinum on carbon and activated nickel. Both sections illustrate the beneficial effects of ultrasound on reactions involving metals

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *ULTRASONICS,
*CHEMICAL REACTIONS, SYMPOSIA, STOICHIOMETRY, GROUP I
COMPOUNDS, ALKALI METALS, PLATINUM, NICKEL, CARBON,
REPRINTS.

IDENTIFIERS: (U) Organosilicon, Halosilanes

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 753 CONTINUED

KANSAS UNIV LAWRENCE CENTER FOR RESEARCH IN ENGINEERING
SCIENCE

(U) Automated Crack Identification for Cement Paste.

DESCRIPTIVE NOTE: Final rept. 4 Jun 90-13 Apr 93.

APR 93 77P

PERSONAL AUTHORS: Ketcham, Kirk W.; Romero, Francisco A.;
Darwin, David; Gong, Shanglong; Abou-Zeid, Mohamed N.

REPORT NO. SM-34

CONTRACT NO. AFOSR-89-0296

PROJECT NO. 2302

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0385, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The development of an automated procedure for the identification of microcracks in cementitious materials is described. The degree and nature of microcracking is measured using backscattered electron images obtained with an integrated scanning electron microscope/image analysis system. Multiple developed to identify and measure microcracks within the individual phases of cement paste. The procedure is developed to assist in the determination of the roles played by individual phases in cement paste in the formation and propagation of microcracks. Procedures for specimen testing, preparation, imaging, and crack analysis are described, along with a description of the development of the analysis program. The analysis capabilities of the program are demonstrated. The gray level of epoxy-filled cracks in polished cement paste specimens is affected by the atomic number density of underlying and adjacent phases. As a result, cracks cannot be identified based on gray level alone. Epoxy-filled cracks in polished cement paste specimens can be identified of geometric requirements; and combined procedures that establish the floor of a crack, minimum gradient and gray level adjacent to cracks, and minimum differences in gray level

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between the floor of a crack and adjacent solid phases provide a reproducible and consistent technique for crack identification in cement paste... Backscattered electron imaging, Backscattering coefficient, Calibration, Cement paste, Cracking, Epoxy impregnation, Gray levels, Hydration, Image acquisition, Image analysis.

DESCRIPTORS: (U) *CEMENTS, *MICROCRACKING, *ADHESIVES, *DETECTION, ATOMIC PROPERTIES, BACKSCATTERING, COMPUTER PROGRAMS, DETERMINATION, ELECTRON MICROSCOPES, HYDRATION, IDENTIFICATION, IMAGES, IMPREGNATION, PROPAGATION, SCANNING, ELECTRON MICROSCOPES, SOLID PHASES.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2302AS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 750 9/3 20/9

AD-A265 750 CONTINUED

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL
ENGINEERING

KINETICS, METHODOLOGY, PREDICTIONS, REFRACTION,
TEMPERATURE, TRANSFER, VARIABLES.

(U) Two Temperature Modeling and Experimental Measurements
of Laser Sustained Hydrogen Plasmas.

IDENTIFIERS: (U) Two temperature modelling, *Hydrogen
plasmas, *Laser sustained hydrogen plasmas.

DESCRIPTIVE NOTE: Annual rept. 16 Jun 92-1 May 93.

MAY 93 245P

PERSONAL AUTHORS: Krier, Herman; Mertogul, Ayhan E.

REPORT NO. UIIU-ENG-93-4015

CONTRACT NO. F49620-92-J-0448

MONITOR: AFOSR, XC
TR-93-0386, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments have been performed which measured the global absorption and thermal efficiency of laser sustained hydrogen plasmas for the first time. Results include global absorption as high as 90% and thermal efficiency as high as 80%. These results validate laser propulsion as a feasible orbital transfer technology. A kinetic nonequilibrium model of laser sustained hydrogen plasmas has been formulated and solved. This model is the first of its kind and includes a discretized beam raytrace with a variable index of refraction based upon plasma electron number density. Model results have compared favorably with experimental results and the model has been used to provide predictions of LSP performance well outside the realm of experiments. Multiple model solutions have been obtained which are dependent upon initial conditions. No significant kinetic nonequilibrium was observed in LSP core regions for incident powers up to 700 kW. Beam refraction by the LSP has been observed to have a major effect on LSP performance. The methodology formulated in this document has direct applicability to two temperature modeling of arcjet plasmas, work which is currently underway at UIUC.... Beamed energy propulsion, Two temperature modeling, Laser sustained hydrogen plasmas.

DESCRIPTORS: (U) *LASERS, *MODELS, ABSORPTION, DENSITY,
EFFICIENCY, ELECTRONS, ENERGY, GLOBAL, HYDROGEN, INDEXES,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 749 9/1 20/11

AD-A265 745 7/2 7/4 7/3

TRUSTEES OF COLUMBIA UNIV NEW YORK

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Study of Improved Critical Currents and Mechanical Properties in YBaCuO Superconductor w/Ag or 211.

(U) A Convenient Synthesis of Tricyclo 3.3.1.13.7 Tetrasilathianes and Tricyclo 3.3.1.13.7 Tetrasilaselanenes.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 92-31 Mar 93.

APR 93 32P

92 3P

PERSONAL AUTHORS: Chan, Siu-Wai

PERSONAL AUTHORS: Boudjouk, Phillip

CONTRACT NO. F49620-92-J-0160

CONTRACT NO. AFOSR-91-0197

PROJECT NO. 2305

PROJECT NO. 2303

TASK NO. GS

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0385, AFOSR

MONITOR: AFOSR, XC
TR-93-0375, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The microstructure of the melted textured bulk YBCO materials with different vol% 211 were investigated. The homogeneity of 211 distribution was greatly improved by using a solution precipitated 211 powder in preparation. Crack spacings were found to decrease with increasing vol% of the 211 particles. The 211 particles were found to be effective in holding crack propagation. Hardness and toughness measurements will be performed. The measured critical current density in high fields in epitaxial thin films of YBCO were compared with both the flux pinning and pair breaking models. This work was published Nov, 92. High quality YBCO films were grown on spine and garnet. These substrate materials can interface between the superconducting and semiconducting materials for novel devices. This paper was submitted to APPL... Superconductors, Critical currents, Dispersions, Thin films, Flux-pinning.

DESCRIPTORS: (U) *CRACK PROPAGATION, *MICROSTRUCTURE, *SUPERCONDUCTORS, CURRENT DENSITY, DISPERSIONS, DISTRIBUTION, GARNET, HARDNESS, HOMOGENEITY, INTERFACES, MATERIALS, MODELS, PARTICLES, POWDERS, SPINEL, SUBSTRATES, THIN FILMS, TOUGHNESS.

AD-A265 749

AD-A265 745

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Availability: Pub. in Inorganic Chemistry, v31 p712-713 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) There are only two reports describing the synthesis of adamantane-like structures composed of silicon and selenium (RSi) 4 Se 8, one which utilizes volatile H2Se with a trichlorosilane and the other requiring a reaction time several days between trichlorosilane and hexamethyldisilathiane. Of the few references for synthesizing the silicon-sulfur system, only one gives good yields deriving from RSiCl3 and (Me3Si) 2S. The instability of the Si-S or Si-Se bond toward hydrolysis imposes the requirement of an anhydrous route to these compounds. Recently we have reported convenient high-yield procedures for making anhydrous Na2S and Na 2Se from sodium, sulfur, or selenium and a catalytic amount of naphthalene in THF as a useful step in preparing a variety of organic and organosilicon chalcogenides

DESCRIPTORS: (U) *SILICON, *SELENIUM, *CYCLIC COMPOUNDS, *ADAMANTANES, *SODIUM, REPRINTS, SYNTHESIS, ATOMS, SULFUR, NAPHTHALENES, CATALYSIS, HYDROLYSIS, METHYL RADICALS, CHLOROSILANES, HYDROCARBONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230385, Cage

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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AD-A265 744 7/8

Structures, Tetrahydrofuran, Chalcogenides,
*Tetrasilathianes, *Tetrasilaselenanes.

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

- (U) Transition Metal Coordination Compounds: Solvated and Unsolvated Anhydrous Metal Chlorides From Metal Chloride Hydrates $MCl_n \cdot xH_2O + 2x(CH_3)_3SiCl - MCl_n + xC_3H_7SiCl_2 + 2xHCl$.

92 3P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. AFOSR-88-0060

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0370, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Synthesis, v29 chapter 3 p108-110 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Although there are several methods for preparing anhydrous metal halides, thermal and chemical methods of removing water from hydrated metal halides are the most frequently employed. The pyrolysis of metal halide hydrates has been studied extensively and can lead to anhydrous salts, although temperature control is important for many hydrates because water is released stepwise and mixtures of hydrates can be obtained. Dehydrating agents such as 2,2-dimethoxypropane and thionyl chloride are efficient dehydrating agents and have been widely used. The former has the disadvantage of producing methanol and acetone, which often associate with metal halides, thus thionyl chloride has been used as the standard dehydrating agent for metal chlorides. On refluxing, it reacts with water to evolve hydrogen chloride and sulfur dioxide. Even though these by products are removed from the reaction mixture, there are drawbacks involved with thionyl chloride: it is a severe lachrymator that must freshly distilled before use, and, because the reaction is slow, it must be used in excess to achieve convenient rates of dehydration. Removing the last traces of thionyl chloride is sometimes difficult.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 744 CONTINUED

AD-A265 743 11/2 17/1

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

DESCRIPTORS: (U) *TRANSITION METAL COMPOUNDS,
*DESICCANTS, HYDRATES, DRYING, REPRINTS.

(U) Characterization of Acoustic Emission Source to
Identify Fracture in Concrete.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, Coordination
compounds, *Metal hydrates, *Anhydrous metal chloride,
Drying techniques.

DESCRIPTIVE NOTE: Final rept. Dec 89-Nov 82,

APR 93 81P

PERSONAL AUTHORS: Shah, Surendra P.

CONTRACT NO. AFOSR-90-0101

MONITOR: AFOSR, XC
TR-93-0402, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the theoretical basis, experimental approaches, and results of research to evaluate fracture properties of concrete using quantitative acoustic emission (AE) analysis techniques. Analytical tools were developed to process AE data. These tools included improvements in P-wave arrival analysis, AE source location calculation, and multichannel deconvolution techniques. The microfracture characteristics of mortar was evaluated using a three dimensional moment tensor analysis. Microcracking was found to be primarily mixed mode and shear. A new technique for testing concrete in uniaxial tension was developed. Using this technique localization and strain-softening behavior was examined. Microcracking was found to be evenly distributed throughout the specimen until about 80% of peak load. At this point localization began and the microcracks coalesced into a single macrocrack. Acoustic emission, Microcracking, Quasi-brittle materials, Damage localization.

DESCRIPTORS: (U) *ACOUSTIC EMISSIONS, *CONCRETE,
*MICROCRACKING, *FRACTURE(MECHANICS), DAMAGE, MOMENTS,
MORTARS, MULTICHANNEL, SOFTENING, TENSION, TENSOR
ANALYSIS, TENSORS, THREE DIMENSIONAL, ACOUSTIC DETECTION,
SHEAR STRESSES, NONDESTRUCTIVE TESTING, DAMAGE ASSESSMENT,
BRITTLENESS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 741 7/4 20/5 20/10

AD-A265 737 20/4

CALIFORNIA UNIV LOS ANGELES

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Pseudospectral Double Excitation Configuration Interaction.

(U) Evidence of Saturation in a Gravity Wave Critical Layer.

MAY 93 6P

DEC 92 5P

PERSONAL AUTHORS: Martinez, Todd J.; Carter, Emily A.

PERSONAL AUTHORS: Dunkerton, Timothy J.; Robins, Robert E.

CONTRACT NO. F49820-92-J-0244

CONTRACT NO. F49820-89-C-0051

PROJECT NO. 3484

PROJECT NO. 2310

TASK NO. S2

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0368, AFOSRMONITOR: AFOSR, XC
TR-93-0365, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 p7081-7085 1993. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in Jnl. of the Atmospheric Sciences, v49 n24 p2560-2583, 15 Dec 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We present a pseudospectral formulation of the single reference, closed shell double excitation configuration interaction method using a generator state self-consistent electron pair approach. The method scales as $O(n^2n^3)$, compared to the conventional scaling of $O(n^2n^4 + n^3n^3)$. In no case tested does the pseudospectral energy differ by more than 0.35 mhartree from the conventional result.

ABSTRACT: (U) High-resolution numerical simulations of an overturned (convectively unstable) gravity wave critical layer were continued into an asymptotic regime in which the wave spectrum, and low-pass primary wave fields, were statistically stationary. This is the first example of steady equilibration between a gravity wave forced at the model's lower boundary, and the turbulent dissipation of wave energy in the region of wavebreaking in the critical layer. The equilibration supports the concept of wave saturation and theories which parameterize the effects of breaking in terms of convectively neutralized waves.... Gravity wave, Critical layer, Saturation, Wavebreaking.

DESCRIPTORS: (U) *CONFIGURATIONS, *EXCITATION, *INTERACTIONS, ELECTRONS, ENERGY, FORMULATIONS, GENERATORS, REPRINTS, QUANTUM ELECTRONICS, MOLECULAR ORBITALS, SPECTRA.

IDENTIFIERS: (U) PEG1103D, WUAFOSR3484S2.

DESCRIPTORS: (U) *GRAVITY, *TURBULENT FLOW, *BOUNDARY LAYER FLOW, BOUNDARIES, DISSIPATION, ENERGY, GRAVITY WAVES, HIGH RESOLUTION, SATURATION, SIMULATION, MATHEMATICAL MODELS, CONVECTION, TURBULENT BOUNDARY LAYER, THREE DIMENSIONAL, REPRINTS.

*Pseudospectral, Self-consistent, Closed shells, CI(Configuration Interaction), SCEP(Self-Consistent Electron Pair).

IDENTIFIERS: (U) PEG1102F, WUAFOSR2310A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 735 21/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Tin-Sulfur and Tin-Selenium Phenylated Ring Systems as Organometallic Precursors in Tin Sulfide and Tin Selenide.

(U) Theories of Turbulent Combustion in High Speed Flows.

DESCRIPTIVE NOTE: Annual rept. Apr 92-Apr 93,

92 7P

APR 93 7P

PERSONAL AUTHORS: Boudjouk, Phillip

PERSONAL AUTHORS: Libby, P. A.; Williams, F. A.

CONTRACT NO. AFOSR-88-0060

CONTRACT NO. F49620-92-J-0184

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. B2

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0372, AFOSRMONITOR: AFOSR, XC
TR-93-0382, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Group 14-18 six-membered rings, (PH2EX) 3 (E = Si, Sn; X = S, Se), were synthesized in 49-61 % yield from Ph2EC12 and anhydrous Na2X made from elemental Na and X with a catalytic amount of naphthalene in THF. Pyrolysis of the tin-containing rings, (Ph2SnS) 3 and (Ph2SnSe) 3, at temperature over 300 deg C in helium atmosphere yielded microcrystalline black powders identified as SnS or SnSe by X-ray diffraction. Scanning electron micrographs show the powders to consist of agglomerates of crystals having platy (SnS) or prismatic (SnSe) habits

DESCRIPTORS: (U) *TIN COMPOUNDS, *SULFUR, *SELENIUM, *ORGANOMETALLIC COMPOUNDS, *SULFIDES, REPRINTS, PHENYL RADICALS, RINGS, PRECURSORS, SELENIDES, SODIUM, CATALYSIS, NAPHTHALENES, FURANS, PYROLYSIS, POWDERS, X RAY DIFFRACTION, SCANNING ELECTRON MICROSCOPES, CRYSTALS, SOLAR CELLS, SEMICONDUCTORS, ALKYL RADICALS, SILICON, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Group 14-16 Compounds, Tetra hydrofuran, Microcrystalline, Micrographs.

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AD-A265 735

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ABSTRACT: (U) This research involves theoretical studies of the chemical and fluid mechanical phenomena which make turbulent combustion in high-speed flows different from such combustion in low-speed flows. Finite-rate chemistry plays a significant role in high-speed flows because of the small ratios of flow times to chemical times. The studies address ignition and extinction phenomena in nonpremixed turbulent combustion of hydrogen-air systems by both numerical and asymptotic methods. Attention also is paid to effects of compressibility in high-speed turbulent combustion, with consideration given to interdispersal configurations of shocklets and flamelets. Efforts are made to provide a firmer foundation for the modeling of high-speed turbulent reacting flows, to aid in the development of a formulation which gives results that can be compared with experiments, on turbulent combustion.... Turbulent flames, Diffusion flames, Supersonic combustion.

DESCRIPTORS: (U) *IGNITION, *SUPERSONIC COMBUSTION, *TURBULENT FLOW, COMBUSTION, COMPRESSIVE PROPERTIES, CONFIGURATIONS, DIFFUSION, FLAMES, HYDROGEN, RATIOS, VELOCITY, HIGH VELOCITY, LOW VELOCITY, CHEMICAL REACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 734 9/5

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

(U) Efficient Optical Logic, Interconnections and
Processing Using Quantum Confined Structures.

DESCRIPTIVE NOTE: Final rept. 30 Sep 89-31 Mar 83,

APR 83 82P

PERSONAL AUTHORS: Coldren, L. A.; Gossard, A. C.; Barron,
C. C.; Thompson, G.; Whitehead, M.

REPORT NO. ECE-TR-93-10

CONTRACT NO. AFOSR-89-0549

PROJECT NO. 2305

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0395, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final report of AFOSR-89-0549.
It summarizes work extending over the entire contract
period which began 30 Sept 1989. The work is not reported
in chronological order. Rather, it is organized according
to subject, and it is intended to be somewhat tutorial,
although only work at UCSB is included.

DESCRIPTORS: (U) *MODULATORS, *ELECTROOPTICS, CONTRACTS,
WORK, HIGH FREQUENCY, TRANSVERSE, SENSITIVITY, SYMMETRY,
ASYMMETRY.

IDENTIFIERS: (U) WUAFOSR2305DS, Electroabsorption,
*Fabry perot modulators, Electrorefraction.

AD-A265 734

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AD-A265 732 8/4

CHICAGO UNIV IL DEPT OF MEDICINE

(U) Phase-Shifting Effect of Light and Exercise on the
Human Circadian Clock.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 81-28 Feb 83,

MAY 93 19P

PERSONAL AUTHORS: Cauter, Eve V.

CONTRACT NO. AFOSR-90-0222

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0378, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of the present study was to
determine the magnitude and direction of immediate
phaseshifts of human rhythms following a single exposure
to a 3-hour pulse of bright light or physical activity.
The pulse of light or activity was presented under
constant routine conditions and measurement of the
resultant phase-shifts were performed under the same
constant routine conditions on the first day following
pulse presentation. Four over rhythms which are strongly
dependent on circadian timing, i.e., the rhythms of
plasma cortisol, plasma TSH, plasma melatonin and body
temperature, were monitored. Based on the analysis of the
TSH profiles, our findings indicate that exposure to
light around the time of the minimum of body temperature
results in phase-advances averaging less than one hour in
magnitude. Exposure to light approximately 3 hours before
the time of the minimum of body temperature results in 1-
2 hour phase delays. Preliminary analyses of the
melatonin profiles confirm these observations. Our
findings regarding the effects of exercise are still
inconclusive.

DESCRIPTORS: (U) *BODY TEMPERATURE, *LIGHT,
*EXERCISE(PHYSIOLOGY), *CIRCADIAN RHYTHMS, CORTISOL,
DELAY, HUMANS, MELATONIN, OBSERVATION, PHASE, PROFILES,
PULSES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 730 7/4 20/10 7/2 20/5

FLORIDA UNIV GAINESVILLE

IDENTIFIERS: (U) Phase shifting, Light effects, Exercise effects, PEG1102F, WUAFOSR2312CS.

(U) Development of Practical MO Techniques for Prediction of the Properties and Behavior of Materials.

DESCRIPTIVE NOTE: Final rept. 1 Nov 80-31 Oct 82,

MAY 83 6P

PERSONAL AUTHORS: Devar, Michael J.

CONTRACT NO. AFOSR-91-0085

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR. XC
TR-93-0400, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The original SAM1 program has been completely rewritten and optimized, and geometry optimization is now carried out using analytical derivatives instead of finite difference. Satisfactory parameters for carbon and hydrogen were obtained. However, problems were found for the case of nitrogen and oxygen, particularly for compounds containing N-N bonds. Testing of SAM1 was carried out by performing calculations for an extensive set of molecular species for which apparently reliable experimental data are available.

DESCRIPTORS: (U) *CARBON, *HYDROGEN, *NITROGEN, *MOLECULAR ORBITALS, *PREDICTIONS, *QUANTUM CHEMISTRY, EXPERIMENTAL DATA, GEOMETRY, OPTIMIZATION, OXYGEN, PARAMETERS, KINETIC ENERGY, CHEMICAL BONDS, COMPUTATIONS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2, SAM1 Computer program, Self assembled monolayer

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AD-A265 728 CONTINUED

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

(U) Nonlinear Laser Spectroscopy Studies of Semiconductor
Heterostructures.

DESCRIPTIVE NOTE: Final rept. 15 Dec 89-14 Jan 93.

JAN 93 81P

PERSONAL AUTHORS: Steel, Duncan

CONTRACT NO. AFOSR-90-0100

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0397, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research progress in quantum optoelectronics has dominated much of the recent literature in semiconductors because of the new physical phenomena which can be observed and because of the potential for new smaller and higher speed devices of importance to communications, computing, and other high information density applications. Much of the work has focused on III-V compounds because it is believed these materials may provide improved performance over silicon. In addition since they are a direct band gap semiconductor, there are also potential optical applications. Under this AFOSR grant, our laboratory has been involved in the general area of the study of the optical physics of semiconductors. These studies have provided new insight into the nature of optical properties as well as material properties. The work has emphasized the application of coherent nonlinear laser spectroscopy methods in the study of bulk GaAs and GaAs/AlGaAs quantum wells. This work is based on frequency and time domain four-wave mixing techniques, many of which were developed by our group under earlier AFOSR support. These experiments are enabling us to measure many properties of these systems as well as showing that in heterostructures, the effects of disorder must be included in order to provide a complete understanding.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 727 CONTINUED

BRIGHAM YOUNG UNIV PROVO UT DEPT OF CHEMICAL ENGINEERING

(U) Distributed Combustion in Solid Propellants.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-1 Feb 92.

MAR 93 58P

PERSONAL AUTHORS: Beckstead, M. W.; Brooks, K. P.

CONTRACT NO. AFOSR-91-0152

PROJECT NO. 2308

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0401, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes work on a research program to quantify the effect of distributed combustion of metal particles in a Rijke burner. Under a previous contract experimental data were obtained with the Rijke burner, and a mathematical model of the burner was developed. To improve the model, the McIntosh flame model, based on large activation energy asymptotics, has been coupled to the acoustic model. Results have been compared to experimental data showing that the McIntosh transfer function is an improvement over previous models. Law's model of aluminum combustion has been modified to include the effects of multiple oxidizers and their products, oxide accumulation on the surface of the burning aluminum particle, and convection. There are no adjustable parameters in the improved aluminum combustion model, and both transport and thermodynamic properties are calculated internally. Results indicate that the modified model compares more favorably to experimental data than a simple liquid droplet model. The aluminum combustion model has also been coupled to the Rijke acoustic model. Calculations show a sensitivity to the size of the region of influence surrounding a particle and to the time lag between the particle response and the acoustic pressure. The results show reasonable agreement with available data for aluminum particles burning in the Rijke burner. . . . Unstable combustion. Distributed combustion. Acoustic instability.

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DESCRIPTORS: (U) *COMBUSTION, *SOLID PROPELLANTS, ACCUMULATION, ACOUSTICS, ACTIVATION ENERGY, AGREEMENTS, ALUMINUM, BURNERS, CONTRACTS, CONVECTION, EXPERIMENTAL DATA, FLAMES, FUNCTIONS, INSTABILITY, LIQUIDS, MATHEMATICAL MODELS, METALS, OXIDES, OXIDIZERS, PARAMETERS, PARTICLES, PRESSURE, REGIONS, RESPONSE, SENSITIVITY, SURFACES, THERMODYNAMIC PROPERTIES, TIME, TRANSFER FUNCTIONS, TRANSPORT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308AS.

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DTIC REPORT BIBLIOGRAPHY

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HARNEMANN UNIV PHILADELPHIA PA DEPT OF MENTAL HEALTH SCIENCES

WYOMING UNIV LARAMIE

(U) Locus Coeruleus, Vigilance and Stress: Brain Mechanisms of Adaptive Behavioral Responsiveness.

(U) Cellular Mechanism of Turnover of the Stress Induced Protein HSP 70.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 90-14 Dec 91.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 92-14 Apr 93.

DEC 91 15P

MAY 93 8P

PERSONAL AUTHORS: Aston-Jones, Gary

PERSONAL AUTHORS: Petersen, Nancy

CONTRACT NO. AFOSR-90-0147

CONTRACT NO. F49620-92-J-0234

PROJECT NO. 2312

PROJECT NO. 2312

TASK NO. BS

TASK NO. AS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0379, AFOSR

TR-93-0383, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The work has been going quite well. We find that the phasic activation of LC cells by target cues in our vigilance task does not occur during epochs of high tonic LC activity, which also corresponds with poor performance (longer latency bar responses and more false alarms). These results lead us now to speculate that the phasic responses of LC neurons to targets may help in discrimination between target and non-target cues (d'), while the elevated tonic activity may increase the overall tendency of the animal to respond behaviorally to any stimulus (B). We also have some preliminary data indicating that activation of LC with pilocarpine decreases attentiveness to the task (as measured by fixation frequency). Finally, we are finding close relationships between LC activity and pupil diameter during the task, revealing a close correspondence with autonomic arousal.

DESCRIPTORS: (U) *VIGILANCE, *BRAIN, ACTIVATION, ANIMALS, DIAMETERS, DISCRIMINATION, FALSE ALARMS, NERVE CELLS, RESPONSE, TARGETS, WARNING SYSTEMS, VISUAL PERCEPTION, REACTION(PSYCHOLOGY).

IDENTIFIERS: (U) PE81102F, WUAFOSR23128S, Nerve activity, Brain activity, Locus coeruleus.

AD-A265 724

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ABSTRACT: (U) Synthesis of the heat shock protein, hsp70, appears to be essential for recovery from heat and chemical stress. Both because of the role of this protein in cellular recovery from stress and because of the possibility of using levels of hsp70 synthesis or accumulation as a measurement of cellular response or stress, it is important to study the stability of hsp70. We have shown that Drosophila hsp70 decays in vitro by an autolytic mechanism (Mitchell et al., 1985). Autolytic decay could be part of the feedback mechanism regulating the levels of hsp70 accumulation if it occurs in vivo. To determine whether autolytic decay is occurring in vivo, we propose to identify the in vivo breakdown products of hsp70 and to compare their N-terminal sequences to those of the in vitro breakdown products. Precisely the same cutting site would indicate that the same protease may be responsible for the decay in both cases. We will also determine the site of the protease activity in hsp70 for the in vitro decay.

DESCRIPTORS: (U) *RECOVERY, *HEAT STRESS(PHYSIOLOGY), ACCUMULATION, CHEMICALS, CUTTING, DECAY, DROSOPHILA, FEEDBACK, HEAT, MEASUREMENT, PEPTIDE HYDROLASES, PROTEINS, RESPONSE, SEQUENCES, SITES, STABILITY, SHOCK(PATHOLOGY), RELAXATION(PHYSIOLOGY), SYNTHESIS(CHEMISTRY).

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IDENTIFIERS: (U) PEB1102F, WUAFOSR2312AS, Heat shock protein.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Relegation for Decentralized Control.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-30 Sep 82.

FEB 83 145P

PERSONAL AUTHORS: Ozguner, U.

CONTRACT NO. F49620-89-C-0046

MONITOR: AFOSR, XC
TR-93-0390, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this report, we describe the total effort at Ohio State on the Project Relegation for Decentralized Control. The first part of this reflects on one of the primary research topics which was considered in the first year of research. This work performed in the first year concentrated on optimal relegation. In the second part of the report, we concentrate on circuit analogies for large flexible space structures. Many large-scale systems such as flexible spacecraft appendages are nonlinear in behavior. But their large scale makes centralized control difficult. Thus, we propose several methods for designing decentralized control laws that take system nonlinearities into account. Equally important is the task of modeling large-scale systems. This motivated research on applying well-known circuit theory techniques to the problem of modeling flexible structures. The third part of this report describes work performed on another primary research topic which was considered in the first year of research-the use of singular perturbations for multi-time scale analysis of two-link structures. This work was developed for use in embedding active materials into the links and relegating the control tasks

DESCRIPTORS: (U) *DECENTRALIZATION, *OPTIMIZATION, *CONTROL SYSTEMS, *SPACE SYSTEMS, FLEXIBLE STRUCTURES, CIRCUITS, ANALOGIES, MANIPULATORS, SPACECRAFT, NONLINEAR SYSTEMS.

IDENTIFIERS: (U) Space structures

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 719 CONTINUED

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Chemiluminescence Spectra and Cross Sections for the
Reaction of B(4p 2P) with H2 and D2.

93 8P

PERSONAL AUTHORS: Yang, Xuefeng; Dagdigan, Paul J.

CONTRACT NO. AFOSR-91-0363

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0368, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v87 n17
p4270-4278 1993. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) Chemiluminescence spectra of electronically excited BH/BD products from the reaction of B(4p 2p) with H2 and D2 have been observed and analyzed. The boron atom reagent was formed by 268 nm multiphoton dissociation of BBr3, and the 4p 2p level was prepared by sequential laser-induced radiative transitions through the 3s 2S level. Chemiluminescence rate constants for production of the A1pi, b3signa (-), and C'1delta electronic states were determined by comparing the intensities of the product chemiluminescence and the 4p 2P (right arrow) 3s 2S radiative decay of the atomic reagent. From a consideration of the B + H2 yields BH + H adiabatic correlation diagram, it is concluded that formation of the observed products occurs through nonadiabatic transitions from highly excited BH2 potential energy surfaces. Such a model qualitatively explains the large difference in the chemiluminescence cross section between the H2 and D2 reactions.... Boron, Chemiluminescence.

DESCRIPTORS: (U) *CHEMILUMINESCENCE, *DISSOCIATION, *ELECTRONIC STATES, *BORON HYDRIDES, *DEUTERONS, ATOMS, BORON, CONSTANTS, CORRELATION, CROSS SECTIONS, DECAY, ENERGY, INTENSITY, LASERS, MODELS, POTENTIAL ENERGY.

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AD-A265 718 CONTINUED

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) A Convenient Synthesis of 1,1,1,3,3,3-Hexaphenyldiplumbathiane and 1,1,1,3,3,3-Hexaphenyldiplumbaselenane.

92 3P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. AFOSR-81-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-83-0373, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry, v31 p4015-4018 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Hexaphenyldiplumbathiane has been synthesized by several methods which include mixing Ph 3 PbCl and aqueous sodium sulfide in ethanol, stirring (Ph 3 Pb) 2 with sulfur powder for several days, and treating Ph 3 PbCl with Ph 3 PbSi in tetrahydrofuran. Only one procedure has been reported for synthesis of hexaphenyldiplumbaselenane, and it requires Ph 3 PbCl and Ph 3 PbSeI. Recently we reported new methods for making anhydrous sodium sulfide and sodium selenide and are now investigating their utility in the synthesis of group 14-group 16 organometallic compounds, which may be useful as precursors to group 14-group 16 binary semiconductor materials. We report here the usefulness of these reagents in the synthesis of (Ph 3 Pb) 2 S and (Ph 3 Pb) 2 Se by treating them with Ph3PbCl or Ph 2 PbCl 2

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *SODIUM, *SELENIDES, *SULFIDES, *CHLORIDES, SYNTHESIS, REPRINTS, PHENYL RADICALS, SULFUR, POWDERS, MIXING, FURANS, SEMICONDUCTORS, MATERIALS, PRECURSORS.

IDENTIFIERS: (U) PB61102F, WJAFOSR2303B2, *Hexa Phenyl Plumbathiane, *Hexa Phenyl Plumbaselenane, Tetra

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

UNIVERSITY OF SOUTH FLORIDA TAMPA DEPT OF PHYSICS

(U) Trityl Tetrakis(3,5-bis(trifluoromethyl)phenyl)-Borate:
A New Hydride Abstraction Reagent.

92

4P

PERSONAL AUTHORS: Boudjouk, Phillip; Bahr, Steven R.

APR 93 24P

PERSONAL AUTHORS: Djeu, N.

CONTRACT NO. AFOSR-91-0197

CONTRACT NO. AFOSR-89-0263

PROJECT NO. 2303

PROJECT NO. 2301

TASK NO. 82

TASK NO. A1

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0377, AFOSR

TR-93-0396, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v57
p5545-5547 1992. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) The potential of crystal fibers for the
generation of short wavelength visible laser radiation
was explored under this program. There were two major
thrusts to this work. One of them was the search for a
suitable technique to produce low loss crystal fibers.
Implantation cladding of bare crystal fibers with high
energy ion beams was investigated for this purpose. The
other was the identification of a suitable upconversion
process which would be amenable for implementation in the
crystal fiber form. For what the upconversion laser
potential of Tm:YAG was explored

ABSTRACT: (U) The synthesis and properties of a new,
very efficient hydride abstraction reagent are described
in detail

DESCRIPTORS: (U) *HYDRIDES, *BORATES, *PHENYL RADICALS,
*FLUORINE, *METHYL RADICALS, REPRINTS, ANIONS,
ORGANOMETALLIC COMPOUNDS, CATIONS, DEGRADATION, BORON,
CARBON, CHEMICAL BONDS, SODIUM, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, *Trityl
Tetrakis(3-5-bis(trifluoro methyl) phenyl)borate,
Cycloheptatriene, *Abstraction reagents, Counterions,
Metalloenes, TFP8(Trityl Tetrakis(3-5-bis(trifluoro
methyl) phenyl) borate), Triphenyl methyl group,
Carbenium Ions.

DESCRIPTORS: (U) *LASER BEAMS, *FIBERS, *CRYSTAL GROWTH,
*CLADDING, *FIBER OPTICS, ION IMPLANTATION, LOW LOSS,
SHORT WAVELENGTHS, REFRACTIVE INDEX, LITHIUM NIOBATES,
THICKNESS, YAG LASERS.

IDENTIFIERS: (U) Crystal fibers

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GEORGETOWN UNIV WASHINGTON DC SCHOOL OF MEDICINE

(U) The Key Involvement of Poly(ADP-Ribosylation) in Defense Against Toxic Agents: Molecular Biology Studies.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 92-31 Mar 93,

MAY 93 8P

PERSONAL AUTHORS: Smulson, Mark E.

CONTRACT NO. F49620-92-J-0242

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0384, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our laboratory, during an earlier AFOSR granting period, was the first to isolate and clone a full-length cDNA for this enzyme. We also showed that this cDNA, in an appropriate vector, can be expressed in eukaryotic cells above endogenous levels. Accordingly, our laboratory is capable of performing direct experiments, utilizing recombinant DNA techniques, to test for the role of this enzyme in DNA repair and recovery from toxic agents during the renewal period. For example, we propose to construct expression vectors containing alterations in the active site and the DNA binding domain of PADPRP and to eventually stably integrate these into eukaryotic cells such that expression of these 'analog' PADPRPs will be expressed. Through the use of several of these mutants that we have already expressed in E. coli during the past granting period, the modulation of PADPRP structure should allow us to learn considerably more about the mechanism and role of this enzyme in cells exposed to stressful environments

DESCRIPTORS: (U) *BIOCHEMISTRY, *ENZYMES, *DEOXYRIBONUCLEIC ACIDS, DISEASE VECTORS, TOXIC AGENTS, IONIZING RADIATION, PESTICIDES, GENES, RECEPTOR

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SITES(PHYSIOLOGY), ESCHERICHIA COLI, MUTAGENS, LABORATORY TESTS, HUMANS, MICE, AIR FORCE RESEARCH, MEDICAL RESEARCH, MOLECULAR BIOLOGY.

IDENTIFIERS: (U) Poly(ADP-ribosylation) enzyme, Eukaryotic cells, PADPRP, NAD(Nicotinamide Adenine Dinucleotide), Organelle, Gene expression, PE81102F, WUAFOSR2312AS

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 704 11/4 20/1

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND
ENGINEERING MECHANICS

IDENTIFIERS: (U) WUAFOSR2308A3.

(U) Ultrasonic Wave Interaction with Advanced Complex
Materials for Nondestructive Evaluation Applications.

DESCRIPTIVE NOTE: Final rept. 15 Dec 88-15 Dec 92.

DEC 92 74P

PERSONAL AUTHORS: Nayfeh, Adnan H.

CONTRACT NO. AFOSR-89-0177

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XC
TR-83-0394, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period of the grant we continued our modeling and analysis of the mechanical behavior of complex composite materials. We have developed analytical, and numerical modeling techniques of the influence of general composite laminate orientation on the ultrasonic behavior of anisotropic plates and substrates. In the second phase we introduced piezoelectric effects into our modeling. In the final phase we studied the dynamic response of the layered composite to transient-loadings in the form of time-dependent source loads. Complete documentation of the results of the first two phases were submitted to the AFOSR in the form of yearly reports. Since these reports contained completed items which also appeared in the literature as archival publications, we need not rereport them here. Results for the recently completed works have also been prepared for journal publication. Description of these works are included here in details.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ULTRASONICS, *NONDESTRUCTIVE TESTING, DYNAMIC RESPONSE, DYNAMICS, LAMINATES, PIEZOELECTRIC EFFECT, SUBSTRATES, TRANSIENTS, COMPLEX COMPOUNDS, MECHANICS, NUMERICAL ANALYSIS, ACOUSTIC MEASUREMENT, ANISOTROPY, WAVE PROPAGATION, HARMONIC ANALYSIS.

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Hexamethyldisilathiane,

92

3P

PERSONAL AUTHORS: Boudjouk, Philip

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0371, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Syntheses, v29 ch1.11 p30-32 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Hexamethyldisilathiane(I) has been widely used in synthesis, particularly as a sulfur transfer agent or silylating reagent. The synthesis of hexamethyldisilathiane from sodium sulfide and chlorotrimethylsilane is described here. The present method is based on the convenient in situ syntheses of alkali metal selenides and diselenides. Commercial sodium sulfide or lithium sulfide are reported to be poor substitutes for in situ generated sulfides in this reaction

DESCRIPTORS: (U) *SULFUR, *SODIUM, *METHYL RADICALS, *SILANES, REPRINTS, ALKALI METALS, SELENIDES, SULFIDES, SYNTHESIS, NAPHTHALENES, TOXICITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, Hexamethyldisilathiane, Trimethylchlorosilane.

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(U) Exclusive Beta-Hydrosilylation of Acrylates Catalyzed by Copper-Tetramethylethylenediamine,

93

4P

PERSONAL AUTHORS: Boudjouk, Philip; Kloos, Steven; Rajkumar, Amirthini B.

CONTRACT NO. AFOSR-91-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0374, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organometallic Chemistry, v443, pC41-C43 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Trichlorosilane and methylchlorosilane react with methyl and ethyl acrylate to give high yields of only the beta adduct in the presence of copper salts and tetramethylethylenediamine

DESCRIPTORS: (U) *ACRYLATES, *COPPER, *CHLOROSILANES, CATALYSIS, REPRINTS, METHYL RADICALS, ETHYL RADICALS, SALTS, ETHYLENEDIAMINE, SILICON, OLEFIN POLYMERS, CHEMICAL BONDS, SILANES.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, *Beta hydrosilylation, *Tetramethylethylene diamine, TMEDA(tertamethylethylene diamine), Diamines

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 679 20/5

AD-A265 679 CONTINUED

FLORIDA UNIV GAINESVILLE

*CLUSTERING, *EQUATIONS OF MOTION, *MOLECULAR STATES, CONFIGURATIONS, DENSITY, ELECTRONIC STATES, ELECTRONICS, ENERGY, GROUND STATE, INTERACTIONS, ISOMERS, MOTION, OSCILLATORS, THEORY, TRANSITIONS, WAVE FUNCTIONS.

(U) The Equation of Motion Coupled-Cluster Method. A Systematic Biorthogonal Approach to Molecular Excitation Energies, Transition Probabilities, and Excited State Properties.

MAY 93 12P

IDENTIFIERS: (U) Human capital theory, Labor force, Postservice earning, PE61102F, WUAFOSR2303FS.

CONTRACT NO. F48620-92-J-0141

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-93-0387, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v88 n9 p7029-7039, 1 May 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A comprehensive overview of the equation of motion coupled-cluster (EOM-CC) method and its application to molecular systems is presented. By exploiting the biorthogonal nature of the theory, it is shown that excited state properties and transition strengths can be evaluated via a generalized expectation value approach that incorporates both the bra and ket state wave functions. Reduced density matrices defined by this procedure are given by closed form expressions. For the root of the EOM-CC effective Hamiltonian that corresponds to the ground state, the resulting equations are equivalent to the usual expressions for normal single-reference CC density matrices. Thus, the method described in this paper provides a universal definition of coupled-cluster density matrices, providing a link between EOM-CC and traditional ground state CC theory. Excitation energy, oscillator strength, and property calculations are illustrated by means of several numerical examples, including comparisons with full configuration interaction calculations and a detailed study of the ten lowest electronically excited states of the cyclic isomer of C₄. Quantum theory, Excited electronic states.

DESCRIPTORS: (U) *EXCITATION, *QUANTUM THEORY,

AD-A265 679

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WASHINGTON UNIV SEATTLE DEPT OF MECHANICAL ENGINEERING

*MICROMECHANICS, CRACKS, DYNAMICS, FINITE ELEMENT ANALYSIS, INTERFEROMETRY, MECHANICS, SLIDING, STATICS, FATIGUE(MECHANICS), STATIC LOADS, CRACK PROPAGATION, TENSILE STRESS, STRAIN(MECHANICS).

(U) Macro- and Micro-Mechanics of Mixed-Mode Dynamic Fracture of Concrete. Part 1. Micro-Mechanic Analysis.

DESCRIPTIVE NOTE: Final rept. 15 Dec 80-14 Dec 92,

IDENTIFIERS: (U) Cohesive zone

FEB 93 92P

PERSONAL AUTHORS: Yu, Chang-To; Guo, Zhikai; Kobayashi, A. S.; Hawkins, Neil M.

CONTRACT NO. AFOSR-91-0128

MONITOR: AFOSR, XC
TR-83-0408, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Illinois Univ., Urbana, IL. Dept of Civil Engrg.

ABSTRACT: (U) A hybrid experimental-numerical procedure was used to analyze the micro-mechanics of the mixed-mode, static and dynamic fracture of a concrete three-point bend specimen with an offset precrack. Four/two beam moire interferometry was used to record simultaneously separating horizontal and vertical displacements associated with stable/rapid growth. An elasto-static/elasto-dynamic finite element code was executed in its propagation mode with assumed crack closure stress (CCS) versus crack opening displacement (COD) and crack shearing stress (CSS) versus crack sliding displacement (CSD) relations which were adjusted to match the computed and measured COD's and CSD's. The resultant CCS versus COD and the CSS versus CSD relations were then used to compute the dissipated energy in the FPZ. This energy dissipation rate in the FPZ accounted for about 80% of the total energy release rate throughout the dynamic fracture process. This study also showed that the strain energy released at the crack tip and the dissipated energy in the fracture process zone after crack kinking are due mainly to mode I crack tip deformation. Concrete fracture, Mixed-mode dynamic fracture, Fracture process zone, Moire interferometry, Dynamic finite element analysis.

DESCRIPTORS: (U) *CONCRETE, *FRACTURE(MECHANICS).

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

AD-A265 673 17/8 17/11

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL AND SYSTEMS
ENGINEERING

(U) Estimation With Multisensor/Multiscan Detection Fusion.

DESCRIPTIVE NOTE: Final rept. 1 Mar 92-28 Feb 93.

FEB 93 6P

PERSONAL AUTHORS: Santosa, Fadl

CONTRACT NO. F49820-92-J-0150

PROJECT NO. 2304

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0391, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This first topic deals with a new procedure to carry out nonlinear transformations commonly encountered in practical surveillance systems, that eliminates the bias and provides a correct (rather than optimistic) covariance matrix. The topics covered in sections 2, 5 and 6 deal with discrete optimization (assignment) techniques applied to various multisensor-multitarget problems, including ballistic missile track initiation from a passive orbiting sensor. Section 3 presents some new efficient factorization algorithms that improve the numerical accuracy for several advanced state estimation filters used in practice. Section 4 deals with evaluation of performance measure of complex manufacturing systems

DESCRIPTORS: (U) *MULTISENSORS, *MULTIPLE TARGETS, GUIDED MISSILE DETECTION, MOVING TARGETS, TARGET DETECTION, KALMAN FILTERING, CARTESIAN COORDINATES, TRACKING, ALGORITHMS, COMPUTER AIDED MANUFACTURING, TRANSFORMATIONS(MATHEMATICS).

IDENTIFIERS: (U) PE81102F, WUAFOSR2304DS.

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SEARCH CONTROL NO. T4155F

AD-A265 671 21/2

CORNELL UNIV ITHACA NY

(U) Mapping Closures for Turbulent Combustion.

DESCRIPTIVE NOTE: Annual rept. 15 Feb 92-14 Feb 93.

MAR 93 11P

PERSONAL AUTHORS: Pope, Stephen B.

CONTRACT NO. AFOSR-91-0184

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XC
TR-93-0380, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of the research program is to develop and test an improved model for the process of molecular diffusion in turbulent reactive flows. In application to turbulent combustion, a major shortcoming of existing models is that they are non-local in composition. A model has been developed, based on the construction of a Euclidean minimum spanning tree (EMST). This model is inspired by the mapping closure, and reduces to it in the case of a single composition. In general, the model is asymptotically local, and hence overcomes a major flaw in previous models. Additionally, studies have been made of stochastic Lagrangian models for turbulent reactive flows; and an exact expression has been obtained for the probability density function of temperature (or other random quantities) in statistically stationary turbulence. Turbulent combustion. Mixing model

DESCRIPTORS: (U) *COMBUSTION, *TURBULENT FLOW, CLOSURES, DENSITY, DIFFUSION, MAPPING, MIXING, MODELS, PROBABILITY DENSITY FUNCTIONS, TEMPERATURE, TEST AND EVALUATION, TURBULENCE, LAGRANGIAN FUNCTIONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2, Reactive flow, Turbulent combustion.

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AD-A265 670 20/12 20/10 9/1 20/3 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F
AD-A265 670 CONTINUED

UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS

Small, Macroscopic.

(U) High Frequency Behavior of Long and Small Junctions.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 92.

MAY 93 19P

PERSONAL AUTHORS: Symko, Orest G.

CONTRACT NO. AFOSR-89-0149

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XC
TR-93-0393, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research consisted of studies of the fundamentals and applications of long Josephson junctions and very small junctions, all fabricated out of NbN. We have developed technology for fabricating by reactive sputtering high quality long Josephson junctions with current densities of 100-1,000 A/sq cm. Such junctions were used for studies of giant steps on the I-V curve caused by fluxon pinning and of macroscopic quantum tunneling down to 15 mK. A new system, a long Josephson junction biased at Fiske steps, is presented for studies of Macroscopic Quantum Tunneling. Our results show applications of fluxons in long Josephson junctions for Fluxon Oscillator, Voltage Standard, and for observing Macroscopic Coherent Tunneling. We have also studied very small NbN junctions fabricated with a STM where single electron tunneling is observed. We were the first to present such tunneling at room temperature; this is important for applications. Students and postdoctoral fellows were involved in this research.

DESCRIPTORS: (U) *JOSEPHSON JUNCTIONS, *HIGH FREQUENCY, ELECTRONICS, OSCILLATORS, ROOM TEMPERATURE, SPUTTERING, STANDARDS, TEMPERATURE, TUNNELING, VOLTAGE, NIOBIUM, NITRIDES, CURRENT DENSITY, COHERENCE, SUPERCONDUCTIVITY, MAGNETIC PROPERTIES, QUANTUM ELECTRONICS.

IDENTIFIERS: (U) WUAFOSR2305C3, Fluxons, Single, Long.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 669 12/4

AD-A265 669 CONTINUED

INTEGRATED SYSTEMS INC SANTA CLARA CA

UNCERTAINTY, LEAST SQUARES METHOD.

(U) Set-Membership Identification for Robust Control Design.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A1, *Robust procedures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Mar 93.

APR 83 103P

PERSONAL AUTHORS: Kosut, Robert L.

REPORT NO. ISI-5752-3

CONTRACT NO. F49820-89-C-0119

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC
TR-83-0389, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes accomplishments in developing methods of system identification for robust control design. The starting point is an a priori plant description containing both parametric and nonparametric uncertainty. The identification methods are developed under differing a priori assumptions on the parametric and nonparametric parts of the model set. For example, when a bound on the nonparametric part is known, it is shown that the parameters in the parametric part of the model are contained in either an ellipsoid or hyperboloid, depending on the data. Computational methods are very similar to standard least-squares methods and can be computed in a batch or recursive manner. The parameter set membership description is used for robust control design via a mini-max optimization problem. Other approaches explored include high-order ARX models which produce purely parametric uncertainty under standard statistical assumptions on the disturbances. A learning scheme is also investigated where the control and identification are iteratively coupled by the closed-loop.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS,
*MATHEMATICAL MODELS, ELLIPSOIDS, IDENTIFICATION,
LEARNING, LOOPS, OPTIMIZATION, PARAMETERS, STANDARDS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A285 657 6/4 6/5 23/2 23/1

HAFNEWMANN UNIV PHILADELPHIA PA DEPT OF MENTAL HEALTH SCIENCES

that optimal vigilance performance (e.g., radar monitoring activity) may require an intermediate level of LC activity and high phasic responsiveness of LC neurons.

(U) Locus Coeruleus, Vigilance and Stress: Brain Mechanisms of Adaptive Behavioral Responsiveness.

DESCRIPTORS: (U) *ATTENTION, *MONKEYS, *NERVE CELLS, *CEREBRAL CORTEX, *BRAIN, ACQUISITION, ELECTRODES, FOCUSING, FUNCTIONS, MICROMETERS, MONITORING, NOISE, RESPONSE, SIGNALS, TARGETS, VIGILANCE, AIR FORCE RESEARCH, IN VIVO ANALYSIS, SIGNAL TO NOISE RATIO, RADAR OPERATORS, LABORATORY ANIMALS.

DESCRIPTIVE NOTE: Final technical rept. 15 Dec 89-31 Dec 92,

MAY 93

48P

PERSONAL AUTHORS: Jones, Gary A.

IDENTIFIERS: (U) PE61102F, WUAFOSR23128S, Locus coeruleus neurons, Microwire electrodes, Microadvancer

CONTRACT NO. AFOSR-90-0147

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC

TR-93-0399, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have developed techniques for recording stable unit activity from individual monkey locus coeruleus (LC) neurons using microwire electrodes (25 micrometers diameter). A combination of improved electrode design, new microadvancer and methods to accurately localize the LC nucleus now permits stable recordings of high signal/noise (better than 3/1) from single neurons in LC for several hours in the waking monkey performing a vigilance task. We have found that LC neurons vary activity phasically and tonically during vigilance performance. Phasic responses are selectively evoked by target cues, and follow new targets during acquisition of reversal in this task. Tonically, LC neurons vary activity levels in accordance with attentiveness to the task, as measured by the frequency of foveating a fix spot required to initiate each trial. Results indicate that the LC functions to regulate the stability of attention. In this view, performance on a task requiring focused attention varies with tonic LC activity in an inverted U relationship. Too little LC activity is associated with poor performance due to non-alertness, while high tonic LC activity corresponds to highly labile attention that prevents focusing attention for long time epochs. Together, these results indicate

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

AD-A265 626 1/1 12/1

AD-A265 595 12/4 12/3 17/11

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

COLORADO STATE UNIV FORT COLLINS DEPT OF MATHEMATICS

(U) Computational Methods for Problems in Aerodynamics
Using Parallel and Vector Architectures.(U) Parametric and Combinatorial Problems in Constrained
Optimization.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 92,

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-28 Feb 93,

MAY 93 12P

FEB 93 25P

PERSONAL AUTHORS: Gottlieb, David

PERSONAL AUTHORS: Poore, Aubrey B.

CONTRACT NO. AFOSR-90-0093

CONTRACT NO. AFOSR-91-0138

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. CS

TASK NO. DS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0404, AFOSR

TR-93-0403, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The effort to use spectral methods to simulate flows with shock waves is summarized in four published papers. In (2) the authors study uniform high order spectral methods to solve multi-dimensional Euler equations for gas dynamics. Uniform high order spectral approximations with spectral accuracy in smooth regions of solutions are constructed by introducing the idea of the Essentially Non-Oscillatory (ENO) polynomial interpolations into the spectral methods. Based on the new approximations, nonoscillatory spectral methods which possess the properties of both upwinding difference schemes and spectral methods were proposed. Numerical results are presented for the inviscid Burger's equation, and for one dimensional Euler equations including the interactions between a shock wave and density disturbance, Sod's and Lax's shock tube problems, and the blast wave problem. Finally, the interaction between a Mach 3 two dimensional shock wave and a rotating vortex is simulated.

DESCRIPTORS: (U) *SHOCK WAVES, *SHOCK SPECTRA,
*NUMERICAL ANALYSIS, *GAS DYNAMICS, EULER EQUATIONS,
CHEBYSHEV APPROXIMATIONS, POLYNOMIALS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304CS, Discontinuous
functions, ENO(Essentially NonOscillator).

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ABSTRACT: (U) The data association problem in multi-target tracking has been formulated and solved as a multidimensional assignment problem. Extensive simulations have been performed to demonstrate speed and robustness of these algorithms.

DESCRIPTORS: (U) *ALGORITHMS, *COMBINATORIAL ANALYSIS,
*PARAMETRIC ANALYSIS, *MULTIPLE TARGETS, TRACKING
PROBLEM SOLVING, MULTISENSORS, FALSE ALARMS, PARALLEL
PROCESSORS, CONTROL SYSTEMS, OPTIMIZATION, COMPUTER
ARCHITECTURE, REAL TIME, CONVERGENCE, SYSTEMS ENGINEERING,
INFORMATION THEORY, BIFURCATION(MATHEMATICS).

IDENTIFIERS: (U) WJAFOSR2304DS, PE81102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 594 20/4

AD-A265 334 20/5 7/2 20/12 7/4

OLD DOMINION UNIV NORFOLK VA

CORNELL UNIV ITHACA NY

(U) Structure and Stability of Reacting Compressible Free Shear Layers.

(U) Electronic-to-Vibrational, -Rotational, and -Translational Energy Transfer: S(1D)+CO, N sub 2, O sub 2, and CO sub 2 Measured by Doppler Spectroscopy,

DESCRIPTIVE NOTE: Final rept. Jul 91-Jun 93,

APR 93 8P

JUN 93 14P

PERSONAL AUTHORS: Grosch, C. E.

PERSONAL AUTHORS: Nan, G.; Neyer, D. W.; Houston, P. L.; Burak, I.

CONTRACT NO. AFOSR-91-0250

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. ES

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0231, AFOSR

MONITOR: AFOSR, XC
TR-93-0405, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The contract is in support of research on the structure and stability of reacting compressible mixing layers. The research performed under this contract has resulted in our learning a great deal about the structure and stability of reacting compressible mixing layers.

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, *BOUNDARY LAYER FLOW, LAYERS, MIXING, STABILITY, MACH NUMBER, SUPERSONIC FLOW, SUBSONIC FLOW, SHEAR PROPERTIES.

IDENTIFIERS: (U) WUAFOSR2304CS, PE61102F, Shear flow.

Availability: Pub. in Jnl. of Chemical Physics, v98 n8 p4603-4609 Mar 93.

ABSTRACT: (U) Collisions of S(1D) with CO, N2, O2 and CO2 have been investigated to estimate the fraction of the sulfur electronic energy that is deposited in the internal degrees of freedom in the collision partner during the quenching of S(1D) to S(3P). The experiment measures the Doppler profile of the S(3P) product, a profile that depends both on the amount of energy disposed into internal degrees of freedom and on the differential scattering cross section for the inelastic collision. For CO and N2 the results are consistent with a collision complex model for which the scattering is assumed to be isotropic in the collision plane and for which the energy is partitioned statistically into the degrees of freedom. Under the assumption of isotropic scattering, the results suggest that less energy than the statistical prediction is partitioned into translation for collisions with O2, whereas more energy is partitioned into translation for CO2

DESCRIPTORS: (U) *ENERGY TRANSFER, *SULFUR, *ELECTRONIC STATES, REPRINTS, NITROGEN, OXYGEN, CARBON DIOXIDE, DEGREES OF FREEDOM, INTERNAL, COLLISIONS, QUENCHING, DOPPLER SYSTEMS, PROFILES, SCATTERING, ISOTROPISM, MOLECULAR PROPERTIES, DYNAMICS, VACUUM, LIGHT, ULTRAVIOLET EQUIPMENT, VIBRATION, ROTATION, EXCITATION.

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AD-A265 311 12/1 20/4

ATOMS, DIFFERENTIAL CROSS SECTIONS, GROUND STATE, SPIN STATES, PHOTOLYSIS, SPECTROSCOPY.

MARYLAND UNIV BALTIMORE DEPT OF MATHEMATICS

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303ES

(U) A Simple Model of Melt Fracture.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 91-31 Dec 92.

DEC 92 80P

PERSONAL AUTHORS: Greenberg, James

CONTRACT NO. AFOSR-91-0352

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0323, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The PI produced an excellent explanation of the unpleasant shark-skinning observed in certain polymer extrusion processes. This work has been brought to the attention of researchers at Corning and Hoechst Celanese and Greenberg and Demay will work this summer with members of the Materials Sciences Center at the Ecole Nationale Supérieure des Mines de Paris led by J.F. Agassant. One goal of this work is to see if the same oscillatory phenomena is present when one replaces the slip boundary condition by a no slip one and looks instead at materials whose shear stress - strain rate constitutive equation has a spinodal type nonlinearity. A difficult question also worth pursuing is whether now understanding the nature of the flow instability - a switch from a slip to a no slip boundary condition at the wall of the capillary tube - if it is possible to control the inlet flow to the capillary in the unstable regime in such a way as to reduce the oscillations and shark skinning of the final product.

DESCRIPTORS: (U) *EXTRUSION, *POLYMERS, *FRACTURE(MECHANICS), *SHEAR STRESSES, BOUNDARIES, CAPILLARY TUBES, CONTROL, EQUATIONS, INLETS, INSTABILITY, MATERIALS, MELTS, OSCILLATION, RATES, STRAIN RATE, SWITCHES, FLOW RATE, MATHEMATICAL MODELS, VISCOSITY, STEADY FLOW.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 310 11/4

IDENTIFIERS: (U) WUAFOSR2304A1, Shark skinning.

MICHIGAN UNIV ANN ARBOR DEPT OF CIVIL ENGINEERING

(U) Mechanical Interaction Between Synthetic Fiber and
Cement Base Matrix in FRC Composites.

DESCRIPTIVE NOTE: Final rept. 1 Jul 90-31 Oct 92,

FEB 93 26P

PERSONAL AUTHORS: L1, Victor C.; Chan, Yin-Wen

CONTRACT NO. AFOSR-90-0328

MONITOR: AFOSR, XC
TR-93-0384, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In cement-based materials, cement is usually employed to bind other materials together. Different interfaces are thus generated between various media in the resulted materials. It has been well recognized that the interfacial microstructure between cement binder and inclusions is of the greatest importance for the mechanical properties of the composite. Specifically, in fiber reinforced cementitious composites, the composite material properties are especially predominated by the fiber-cement interface due to its influence on the mechanical interactions between fibers and cement matrix. This report summarizes research investigations and findings of a study of the fiber-cement interfacial debond mode, namely strength-based or fracture-based debond modes, and on an issue of interfacial bond property control. These studies have been done with the help of fiber pull-out experiments using an MTS digitally controlled load frame and micromechanical modeling, accompanied by environmental scanning electron microscopy. We expect that such investigations will provide physical insights into the break-down processes occurring at the interphase levels of fiber reinforced cementitious composites. The knowledge, in turn, may serve to achieve fiber reinforced cementitious composites with higher performance.

DESCRIPTORS: (U) *CEMENTS, *COMPOSITE MATERIALS, BINDERS, FIBERS, INCLUSIONS, INTERACTIONS, INTERFACES, MICROSCOPY, MICROSTRUCTURE, SCANNING, SYNTHETIC FIBERS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 304 7/6 20/13 7/3

IDENTIFIERS: (U) Cement based composites, Fiber,
Interface.

TEXAS UNIV AT AUSTIN

(U) Polymer-Polymer Interactions.

DESCRIPTIVE NOTE: Final rept. 15 Sep 89-14 Nov 92,

MAY 93 16P

PERSONAL AUTHORS: Sanchez, Isaac C.; Paul, Donald R.

CONTRACT NO. AFOSR-89-0479

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0358, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our approach for understanding polymer-polymer interactions is to measure heats of mixing of small molecule analogs. In particular, we have focused on small molecule analogs of polystyrene (PS) and Poly (2, 6 dimethyl phenylene oxide) (PPO). this well-known system is miscible, but the origin of its miscibility has perplexed investigators for over 25 years. Our measurements and associated molecular mechanics/Monte Carlo calculations have firmly established that the two methyl groups on PPO play a significant role in affecting miscibility. We have developed two equation of state models for hydrogen bonding interactions. They represent a significant advance in our understanding of hydrogen bonding interactions in both polymeric and non-polymeric systems. The models have been successfully applied to a variety of systems that include supercritical fluids, solubility of gases in liquid polymers has been treated theoretically using the lattice-fluid model. (Author)

DESCRIPTORS: (U) *POLYSTYRENE, *INTERACTIONS, MEASUREMENT, HEAT, MIXING, MOLECULES, POLYMERS, MONTE CARLO METHOD, METHYL RADICALS, HYDROGEN BONDS, MODELS, SUPERCRITICAL FLOW, SOLUBILITY, GASES, LIQUIDS, HYDROCARBONS, CHLORINATED HYDROCARBONS, POLARIZATION, COMPRESSION, SOLVENTS, HYDROSTATIC PRESSURE, THERMODYNAMICS, FLUIDS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 298 5/8 8/4

IDENTIFIERS: (U) PE81102F, Poly(2-8-dimethyl) Phenylene Oxide), PPO.

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY
(U) Biological and Theoretical Studies of Adaptive Networks: The Conditioned Responses.

DESCRIPTIVE NOTE: Annual rept.,

AUG 92 6P

PERSONAL AUTHORS: Moore, John W.

CONTRACT NO. F49620-92-J-0387

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-83-0282, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Findings to date are as follows: (a) Most cells recorded in the MMGN show modulated activity during both the acoustic conditioned stimulus (CS) and the trace interval between the CS and the unconditioned stimulus (US). (b) Modulation of activity is more likely on CS+ trials than CS- trials and on trials with conditioned responses than on trials without conditioned responses. (c) Differences in modulation of activity is primarily expressed as phasic bursts of firing. These observations are basically consistent with related work in other laboratories that have employed other forms of conditioned behavior and in species besides rabbits. The new information this study provides is that learning related activity occupies that trace interval.

DESCRIPTORS: (U) *CONDITIONED RESPONSE, *NEURAL NETS, *NEUROPHYSIOLOGY, ACOUSTICS, BEHAVIOR, INTERVALS, LABORATORIES, LEARNING, MODULATION, NETWORKS, OBSERVATION, RABBITS, RESPONSE, RUPTURE, WORK, PSYCHOLOGY, ADAPTIVE SYSTEMS, ASSOCIATIVE PROCESSING, BIOLOGY, NERVE CELLS, NERVOUS SYSTEM, PATTERNS, RESPONSE, ADAPTIVE TRAINING.

IDENTIFIERS: (U) PE81102F, WUAFOSR23128S.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A265 295 4/1

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB
(U) An Investigation of the Near Earth Space Environments.
DESCRIPTIVE NOTE: Annual progress rept. 1 Jan-31 Dec 92.

JAN 93 12P

PERSONAL AUTHORS: Meng, Ching I.

CONTRACT NO. F49620-92-J-0186

PROJECT NO. 2311

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0281, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress has been made in four areas: (1) Mapping the different regions of the magnetosphere into the ionosphere under varying solar wind conditions. This research is relevant to future USAF operational systems needs in that the environment experienced by a spacecraft differs greatly depending on the region being transited. (2) Understanding the convection surge mechanism in the magnetotail. (3) Determining the plasma source region for dayside auroral emissions through coordinated satellite imagery and particle data. (4) Creating a new interpretation of dayside auroral transients, involving directly driven ionospheric response to magnetosheath changes.

DESCRIPTORS: (U) *IONOSPHERE, *MAGNETOSPHERE, *SOLAR WIND, *AURORAE, ARTIFICIAL SATELLITES, EMISSION, MAPPING, PARTICLES, SPACE ENVIRONMENTS, SPACECRAFT, TRANSIENTS, CONVECTION(ATMOSPHERIC), PLASMAS(PHYSICS), AIR FORCE OPERATIONS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2311AS, Satellite images

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UNCLASSIFIED

AD-A265 275 20/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Theoretical Investigation of 3-D Shock Wave - Turbulent Boundary Layer Interactions.

DESCRIPTIVE NOTE: Interim rept. 1 Mar-30 Sep 92,

NOV 93 58P

PERSONAL AUTHORS: Knight, Doyle D.

REPORT NO. RU-TR-MAE-184-F

CONTRACT NO. AFOSR-88-0286

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0357, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research concerns the understanding of 3-D shock wave/turbulent boundary-layer interactions. The research effort during the current period focused on the following areas: (a) the 3-D double fin (crossing shock) interaction at Mach 8.3 for symmetric 15 deg fins, (2) the 3-D crossing shock interaction at Mach 4 for symmetric 15 deg fins, and (3) the 3-D triple (triple shock) interaction at Mach 8.3 for 10 deg fins

DESCRIPTORS: (U) *HYPERSONIC FLOW, *TURBULENT BOUNDARY LAYER, *THREE DIMENSIONAL FLOW, *SHOCK WAVES, *INTERACTIONS, SHOCK TESTS, VORTICES, YAW, NAVIER STOKES EQUATIONS, AIR FORCE RESEARCH.

IDENTIFIERS: (U) Triple shocks, High speed inlet systems, Baldwin and Lomax models, Radi models, Flat plate surface pressures, Aerospace engineering, Yaw angle, Pitot

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A265 254 12/7

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Semiclassical Calculation of State-Selective Electronic Predissociation Rate Constants.

(U) Optimization Algorithms for Integer Networks with Side Constraints for Application in Routing and Scheduling.

APR 93 9P

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-31 Dec 92,

PERSONAL AUTHORS: Sahm, David K.; Thompson, Donald L.

FEB 93 124P

CONTRACT NO. AFOSR-90-0048

PERSONAL AUTHORS: Kennington, Jeffery L.

PROJECT NO. 2303

CONTRACT NO. F49620-92-J-0032

TASK NO. B3

PROJECT NO. 2304

MONITOR: AFOSR, XC
TR-93-0297, AFOSR

TASK NO. DS

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0295, AFOSR

Availability: Pub. in Chemical Physics Letters, v205 n2,3 p241-247, 8 Apr 93. Available to DTIC users only. No copies furnished by NTIS.

UNCLASSIFIED REPORT

ABSTRACT: (U) State-selected rate constant for predissociation in collinear N2O (1 sum +) right transition arrow N2 (1 sum + sub g) + O(3P) have been calculated by a classical trajectory surface-hopping method. Specific states (tori), corresponding to semiclassical states given by EBK theory, were found by using adiabatic switching. Potential-energy surfaces that cross were assumed since the nonadiabatic interaction is small. Most trajectories on the initial potential-energy surface are quasiperiodic. The rate constants computed for the various tori show fluctuations.

ABSTRACT: (U) This document presents a new serial and parallel algorithms for the on-to-one shortest problem. This is the current best algorithms for this problem and we believe that our software implementation is the world's fastest code. Other algorithms for various network models, including the pure network problem, the generalized problem, the multicommodity network problem with a piecewise linear convex cost function are also presented.

DESCRIPTORS: (U) *CONSTANTS, *DISSOCIATION, *ELECTRONIC STATES, *COMPUTATIONS, *RATES, *CHEMICALS, DYNAMICS, ELECTRONICS, ENERGY, INTERACTIONS, PHYSICS, POTENTIAL ENERGY, MOLECULAR STATES, NITROGEN, MONOXIDES, ADIABATIC CONDITIONS, REPRINTS, SURFACES, SWITCHING, THEORY, TRAJECTORIES, TUNNELING.

DESCRIPTORS: (U) *ALGORITHMS, *OPTIMIZATION, *COMPUTER NETWORKS, COSTS, ROUTING, SCHEDULING, AIR FORCE PLANNING, MATHEMATICAL MODELS, STATE OF THE ART.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304DS.

IDENTIFIERS: (U) Nonadiabatic reactions, Mode selective behavior, WUAFOSR2303B3, Semiclassical calculation, *Predissociation, Tori, Hopping.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF MEDICINE

OBSERVERS, OPTICS, PATHS, PATTERNS, PSYCHOPHYSICS,
SEARCHING, SIMULATION, VELOCITY, COMPUTERS, CONSTANTS,
MODELS, STIMULI, VOLUME.

(U) Visual Psychophysics of Egomotion.

DESCRIPTIVE NOTE: Interim rept. 1 Feb 92-31 Jan 93.

IDENTIFIERS: (U) Egomotion, Motion perception,
Curvilinear motion, Self motion perception, Eccentricity,
Eye movements, PE61102F, WUAFOSR2313CS.

MAR 93 7P

PERSONAL AUTHORS: Turano, Kathleen

CONTRACT NO. AFOSR-91-0154

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0259, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One study investigated, under two viewing conditions, an observer's ability to determine whether s/he was moving forward along a straight or curved path using simulations of optic flow patterns. In one condition, the retinal image was stabilized against the effects of eye movements, in the other condition, eye movements were unrestricted. Stabilizing the retinal image decreased performance at slow speeds. A second study further explored the role of eye movements in the perception of motion. Speed-difference thresholds were measured under conditions of stabilized and free-viewing conditions. Despite the fact that eye movements can alter the direction and speed of the retinal-image motion relative to the stimulus motion, observers were able to judge speed differences in the free-viewing condition as well as in the stabilized-viewing condition, with the exception of the slowest speed. At the slowest speed, observers were able to detect smaller speed differences in the free-viewing condition. A third study determined the optimal stimulus for motion detection by searching the spatiotemporal stimulus whose direction was identified with least contrast energy. The best stimulus was determined to be at 3 cycles/deg, 1.67 deg/s with bandwidths of 7.08 Hz and 1 - 0.5 octaves.

DESCRIPTORS: (U) *MOTION, *VISUAL PERCEPTION, CONTRAST, DETECTION, ECCENTRICITY, EYE MOVEMENTS, FLOW, IMAGES.

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AD-A265 252 CONTINUED

ARKANSAS UNIV FAYETTEVILLE

(U) Computational Algorithms or Identification of
Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 89-28 Feb
93.

APR 93 78P

PERSONAL AUTHORS: Brewer, Dennis W.; Povers, Robert K.

CONTRACT NO. AFOSR-89-0472

PROJECT NO. 3484

TASK NO. D7

MONITOR: AFOSR, XC
TR-93-0361, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research established a general framework for the convergence of a parameter estimation algorithm based on quasilinearization which applies to a class of distributed parameter systems described by linear dynamical systems. Conditions were established which guarantee local convergence of the identification algorithm. The algorithm was applied to delay and coefficient identification in systems of delay-differential equations. Such systems have been proposed as hereditary models of aeroelastic systems. A numerical identification algorithm was developed and tested for estimating parameters in a Volterra integral equation arising from a viscoelastic model of a flexible structure with Boltzmann damping. In particular, one of the parameters identified was the order of the derivative in Volterra integro-differential equations containing fractional derivatives, a form of viscoelastic damping. A Galerkin approximation in the space variable was used to approximate the partial differential equation with memory by a system of integro-differential equations. Numerical experiments were performed to test the ability of the algorithm to estimate unknown damping parameters in these systems.... Parameter estimation, Fractional derivative damping

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DESCRIPTORS: (U) *ALGORITHMS, *PARAMETERS, COEFFICIENTS, CONVERGENCE, DAMPING, DELAY, DIFFERENTIAL EQUATIONS, EQUATIONS, ESTIMATES, FLEXIBLE STRUCTURES, GUARANTEES, IDENTIFICATION, INTEGRAL EQUATIONS, INTEGRALS, MODELS, PARTIAL DIFFERENTIAL EQUATIONS, STRUCTURES, TEST AND EVALUATION, VARIABLES.

IDENTIFIERS: (U) PE81103D, WUAFOSR3484D7.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A285 250 CONTINUED

PENNSYLVANIA STATE UNIV UNIVERSITY PARK CENTER FOR
MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

(U) Applications of Multivariate Analysis.

DESCRIPTIVE NOTE: Final rept. 1 May 91-31 Jan 93.

JAN 93 18P

PERSONAL AUTHORS: Rao, C. R.

CONTRACT NO. AFOSR-91-0242

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0359, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was carried out in a number of areas of multivariate analysis. New methods have been proposed in the theory of M-estimation to safeguard against outliers. Asymptotic distributions have been derived under a minimal set of assumptions. Bootstrap techniques are extended to nonstandard situations. Theoretical and computational aspects of bootstrap are reviewed. Exact tests have been developed to test the significance of parent-offspring correlations. New methods have been devised for multitarget tracking. The new methods are found to be satisfactory as they depend on minimal assumptions and involve simpler computational algorithms. In the area of probability, Edgeworth expansions have been extended to cover the cases where some of the variables are not continuous, which is considered as a major advance from the point of view of practical applications. A new differential geometric structure of a statistical model is proposed which is more general and more informative than those considered earlier. The methods are applied to study properties of estimates of parameters.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, ALGORITHMS, CORRELATION, DISTRIBUTION, ESTIMATES, EXPANSION, MODELS, NUMBERS, PARAMETERS, PROBABILITY, STRUCTURES, TEST AND EVALUATION, THEORY, TRACKING, VARIABLES, MULTIPLE TARGETS.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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COLORADO STATE UNIV FORT COLLINS DEPT OF STATISTICS

(U) Multivariate Problems of Statistics, Combinatorics, Reliability, and Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-31 Oct 92,

OCT 92

8P

PERSONAL AUTHORS: Srivastava, J.

CONTRACT NO. AFOSR-91-0031

PROJECT NO. 2304

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0380, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A large amount of work, of high quality, was produced under this grant. The PI gave invited talks at ten technical meetings and conferences, was elected to the membership of the Third World Academy of Science, had four papers published, with six more being accepted for publication. Four papers have been submitted for publication and eight papers are in final preparation.

DESCRIPTORS: (U) *COMBINATORIAL ANALYSIS, *SIGNAL PROCESSING, *MULTIVARIATE ANALYSIS, *RELIABILITY, DOCUMENTS, GRANTS, PREPARATION, QUALITY.

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AD-A265 203

1/2

12/5

GEORGE MASON UNIV FAIRFAX VA

(U) Fast Adaptive Maneuvering Experiment (Fame).

DESCRIPTIVE NOTE: Final rept. 7 Aug 91-8 Sep 92,

MAR 92

92P

PERSONAL AUTHORS: Hintz, Kenneth J.

CONTRACT NO. AFOSR-91-0372

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0289, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Fast Adaptive Maneuvering Experiment (FAME) is designed to provide neural network (NN) researchers with a physical, non-linear system of modest dimensionality with coupled dynamics. The system to be controlled is a commercially available model electric helicopter (Whisper) which is secured to a commercially-available stand (Flitemaster, Jr.) which has been modified to limit its range of motion and make it suitable for laboratory operation. The stand has been instrumented with potentiometers to measure all 8 degrees-of-freedom (6-DOF). In order to make the interface to the system as simple as possible a Motorola MC68HC11 microcontroller unit (MCU) has been employed to implement the RS-232 communications protocol, convert the voltages on the potentiometers into angles (8-bit quantization), perform the coordinate conversions to a Cartesian space, reply to requests from the NN controller for helicopter position, and translate commands from the NN controller into appropriate servo commands.

DESCRIPTORS: (U) *NEURAL NETS, *FLIGHT MANEUVERS, *COMPUTER PROGRAMS, ANGLES, CONVERSION, COORDINATES, DEGREES OF FREEDOM, DYNAMICS, HELICOPTERS, INTERFACES, LABORATORIES, LINEAR SYSTEMS, MODELS, MOTION, NETWORKS, OPERATION, POTENTIOMETERS, QUANTIZATION, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3, FAME(Fast

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Adaptive Maneuvering Experiment).

AD-A265 177 11/2 13/8

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Processing and Properties of Coated HPZ Fiber
Reinforced Glass-Ceramic Matrix Composites.

DESCRIPTIVE NOTE: Final rept. May 88-Jan 83,

MAR 83 124P

PERSONAL AUTHORS: Brennan, John; Allen, William;
McCluskey, Philip; Jarmon, David

REPORT NO. R93-970104-2

CONTRACT NO. F49620-88-C-0062

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XC
TR-83-0382, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objective of this program was to utilize fiber coatings to tailor, or 'engineer', the chemistry and bonding characteristics of the fiber/matrix interface in glass-ceramic matrix composites reinforced with Dow Corning's polymer derived Si-N-C-O 'HPZ' fibers such that relatively weak bonding exists at the interface to allow matrix crack deflection to occur, thus increasing the toughness and damage tolerance of the composite, while at the same time maintaining the high temperature oxidative stability of the matrix/coating/fiber interfacial region. In addition, for this particular system which is inherently reactive, the fiber coating must also act as a barrier to interdiffusion and reaction. A secondary objective of this program is to investigate advanced composite processing methods other than the traditional hot-pressing, such as hot isostatic pressing (HIP) and glass matrix transfer molding into integrally woven fiber preforms. During the performance of this contract, the microstructure and properties of HPZ fibers, CVD BN and SiC/BN coatings on HPZ fibers, and barium magnesium aluminosilicate (BMAS) glass-ceramic composites fabricated with these coated fibers were investigated. ... Ceramic composite interfaces, HPZ fiber

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SEARCH CONTROL NO. T4155F

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AD-A265 159 20/4

microstructure, BMAS Glass-ceramic matrix/coated HPZ
fiber composites.

FLORIDA AGRICULTURAL AND MECHANICAL UNIV TALLAHASSEE
(U) Unsteady Flow Past a NACA 0012 Airfoil Pitching at
Constant Rates.

DESCRIPTORS: (U) *GLASS, *PROCESSING, *TOUGHNESS, BARIUM,
BARRIERS, CERAMIC MATRIX COMPOSITES, CHEMISTRY, COATINGS,
CRACKS, FIBERS, HIGH TEMPERATURE, HOT PRESSING,
INTERFACES, ISOSTATIC PRESSING, MAGNESIUM, MICROSTRUCTURE,
POLYMERS, SILICON, TENSILE PROPERTIES, FLEXURAL
PROPERTIES, STABILITY, TEMPERATURE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2HIP(Hot
Isostatic Pressing), HPZ Fibers.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 92.

APR 93 82P

PERSONAL AUTHORS: Lourenco, Luiz M.; Krothapalli, A.; Van
Dommelen, L.; Shih, C.

REPORT NO. FMRL-TR-8

CONTRACT NO. F49829-89-C-0014

PROJECT NO. 2307

TASK NO. GS

MONITOR: AFOSR, XC
TR-93-0383, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic stall process of a NACA 0012
airfoil undergoing a constant-rate pitching up motion is
studied experimentally in a water towing tank facility.
This study focuses on the detailed measurement of the
unsteady separated flow in the vicinity of the leading
and trailing edges of the airfoil. The measurements are
carried out using the Particle Image Velocimetry (PIV)
technique. This technique provides the two-dimensional
velocity and associated vorticity fields, at various
instants in time, in the mid-span of the airfoil. Near
the leading edge, large vortical structures emerge as a
consequence of Van Dommelen and Shen type separation and
a local vorticity accumulation. The interaction of these
vortices with the reversing boundary layer vorticity
initiates a secondary flow separation and the formation
of a secondary vortex. The mutual induction of this
counter-rotating vortex pair eventually leads to the
ejection process of the dynamic stall vortex from the
leading edge region.

DESCRIPTORS: (U) *PITCH(MOTION), *UNSTEADY FLOW,
ACCUMULATION, AIRFOILS, BOUNDARY LAYER, CONSTANTS,
COUNTERS, DYNAMICS, EJECTION, FACILITIES, FLOW SEPARATION.

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IMAGES, INTERACTIONS, LAYERS, LEADING EDGES, MEASUREMENT, MOTION, PARTICLES, RATES, REGIONS, SECONDARY FLOW, SEPARATION, STRUCTURES, TIME, TOWING, TRAILING EDGES, TWO DIMENSIONAL, VANS, VELOCITY, VORTICES, WATER.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307CS.

AD-A265 141 13/8 11/3 11/2

TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD HAIFA (ISRAEL)

(U) Electrophoretic and Electrolytic Deposition of Ceramic Particles on Porous Substrates.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-30 Nov 92.

SEP 92 278P

PERSONAL AUTHORS: Gal-Or, L.; Haber, S.; Liubovich, S.

CONTRACT NO. AFOSR-89-0474

MONITOR: AFOSR, XC
TR-93-0344, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Electrophoretic deposition of ceramic particles and their penetration into the pores of graphite and a 2D C-C composite were demonstrated and studied theoretically and experimentally for colloidal SiO₂, SiC, Si₃N₄, Al₂TiO₅ and HfTiO₄. The effect of deposition parameters (field intensity, particle concentration, ratio of dielectric constant/viscosity of fluid) on the amount of induced material was experimentally studied. Penetration depth of particles as function of above parameters was analyzed theoretically. Penetration is enhanced by large Peclet numbers and is therefore higher in aqueous suspensions. While coating morphology is better in propanol suspensions. Optimal conditions for coverage and penetration in a two-stage process were therefore determined. Subsequent deposition of two layers was demonstrated and studied for Si₃N₄ on Al₂TiO₅ and SiC on a glass ceramic

DESCRIPTORS: (U) *ELECTROPHORESIS, *ELECTROLYSIS, *CERAMIC COATINGS, IMPREGNATION, COATINGS, GRAPHITE.

IDENTIFIERS: (U) Electrolytic deposition

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AD-A265 132 9/3 7/3

ALABAMA A AND M UNIV NORMAL DEPT OF PHYSICS

IDENTIFIERS: (U) PE81103D, Optical phase conjugate,
Fluorescein/dichloro, Acridine, Rhodamine

(U) Optical Phase Conjugate Studies of Organic Dyes Doped
in a Birc Acid Host,

MAR 93 9P

PERSONAL AUTHORS: Reddy, B. R.; Venkateswarlu, P.

CONTRACT NO. AFOSR-90-0160

PROJECT NO. 3484

TASK NO. D7

MONITOR: AFOSR, XC
TR-93-0356, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Optical Society of America.
B. v10 n3 p438-445 Mar 93. Available only to DTIC users.
No copies furnished by NTIS.

ABSTRACT: (U) Nonlinear optical studies of
Dichlorofluorescein, Acridine Yellow, 4-
(Dicyanomethylene)-2-methyl-6-(p-dimethylaminostyryl)-4H-
pyran, Rhodamine 110, and Pyridine-1 dyes doped in a
boric acid host have been studied at Ar laser wavelengths.
Excited-state absorption was demonstrated directly by use
of the pump-probe technique. Ground- and excited-state
absorption cross sections and saturation intensities,
phase-conjugate reflectivities, grating formation, and
decay times were measured for all dyes. Phase-conjugate
signals of Pyridine-1 exhibited oscillatory behavior in
time, which was found to be due to heat produced during
the nonradiative relaxation of the excited molecules.
Third-order susceptibilities were also estimated for the
dye-doped samples from the saturation measurements. The
parameters derived from the saturation data are used to
predict phase-conjugate reflectivities and are compared
with the measurements.

DESCRIPTORS: (U) *OPTICAL MATERIALS, *NONLINEAR OPTICS,
*FLUORESCENT DYES, OPTICAL PROPERTIES, DYE LASERS, BORIC
ACID, ORGANIC MATERIALS, ORGANIC COMPOUNDS, PYRIDINES,
REPRINTS.

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AD-A265 064 20/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Chemical Vapor Deposition of Refractory Metals and Ceramics II. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on December 4-8, 1991. Volume 250.

(U) International Conference on Crystal Growth (10th) Held in San Diego, California, on 18-21 August 1992.

DESCRIPTIVE NOTE: Final rept. 15 Jul 92-14 Jul 93,

APR 93 388P

JUL 93 226P

PERSONAL AUTHORS: Besmann, Theodore M.; Gallois, Bernard M.; Warren, James W.

PERSONAL AUTHORS: Witt, August

PROJECT NO. 2306

CONTRACT NO. F49620-92-J-0394

TASK NO. A2

PROJECT NO. 2305

MONITOR: AFOSR, XC
TR-93-0267, AFOSR

MONITOR: AFOSR, XC
TR-93-0349, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The production of thin or thin films of metals or ceramics by chemical vapor deposition has often been achieved by the use of halide gas precursors. In certain cases, this choice was made purely for reasons of simplicity; gas cylinder, gas species already used in another field, etc. Experience has subsequently shown, however, that this choice can give rise to significant changes in the nature and proportions of deposited phases. These are highly dependent upon: the value of the oxidiser: reducer ratio in the gas phase, the degree of metal oxidation in the halide considered, and possible competition between two reducing agents designed to reduce the halide. These factors, among others, strongly influence the thermochemistry of the deposition reaction. Their roles must therefore be clearly understood. Interpreted and predicted by the thermochemical analysis. Based on examples relating to silicide, nitride and boride deposits, an attempt will be made to determine sensitive parameters and deduce selection criteria

DESCRIPTORS: (U) *VAPOR DEPOSITION, *THERMOCHEMISTRY, HALIDES, GAS CYLINDERS, THIN FILMS, METALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, *Chemical Vapor Deposition.

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SEARCH CONTROL NO. T4155F

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AD-A284 935 20/10 20/3

UTAH WATER RESEARCH LAB LOGAN

NOTRE DAME UNIV IN DEPT OF ELECTRICAL ENGINEERING

(U) Environmental Containment Property Estimation Using QSARS in an Expert System.

(U) Quantum Transport.

DESCRIPTIVE NOTE: Final rept. 18 Aug 89-15 Aug 92,

DESCRIPTIVE NOTE: Annual rept. 15 Mar 92-14 Mar 93.

JUN 93 72P

MAY 93 431P

PERSONAL AUTHORS: Doucette, William J.; Holt, Mark; Denne, Doug

PERSONAL AUTHORS: Lent, Craig S.; Porod, Wolfgang; Bandyopadhyay, Supriyo; Bernstein, Gary H.

CONTRACT NO. AFOSR-89-0509

CONTRACT NO. AFOSR-91-0211

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0175, AFOSR

TR-93-0355, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary goal of this project was to develop a microcomputer-based decision support system utilizing Quantitative Structure Property Relationships (QSPRs) and Quantitative Property Property Relationships (QPPRs) to predict the physical/chemical properties of an organic chemical which are necessary to model its environmental fate. The following specific properties were investigated: aqueous solubility (S), octanol/water partition coefficient (Kow), vapor pressure (Pv), organic carbon normalized soil/water partition coefficient (Koc), Henry's Law constant (H), and bioconcentration factor (BCF)

DESCRIPTORS: (U) *DECISION SUPPORT SYSTEMS, *ORGANIC COMPOUNDS, *MATHEMATICAL MODELS, MICROCOMPUTERS, COEFFICIENTS, CORRELATION, ESTIMATES, SOLUBILITY, VAPOR PRESSURE, CHEMICAL PROPERTIES, PHYSICAL PROPERTIES, PREDICTIONS, SYSTEMS ENGINEERING, DATA BASES, ALGORITHMS, MOLECULAR STRUCTURE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A4, PEP(Property Estimation Program), Henry's law constant, Bioconcentration, MCI(Molecular Connectivity Indices)

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ABSTRACT: (U) During the period April 15, 1992 to April 14, 1993, research carried out by the Nanostructures Group in the Department of Electrical Engineering at Notre Dame was concerned with a variety of quantum transport in mesoscopic structures. This research was funded by the Air Force office of Scientific Research under Grant No. AFOSR-91-0211. The major issues examined included quantum transport in high magnetic fields and modulated channels. Coulomb-coupled quantum dot systems, transmission resonances and zeroes in resonant transport, self-consistent Hartree calculations of transport, lateral quantum wires an pn-junction formation, quantum magnetotransport in disordered systems, magnetoelectric states in quantum wires, anomalous magnetoresistance, electromigration, collision retardation and phonon effects in hot-electron transport, spin-polarized single electronics, single-particle lifetimes in quasi-1D structures, quantum transport experiments in metals, the mesoscopic photovoltaic effect, and new techniques for fabricating quantum structures in semiconductors

DESCRIPTORS: (U) *QUANTUM ELECTRODYNAMICS, MAGNETIC FIELDS, RESONANCE, HARTREE FOCK APPROXIMATION, TRANSPORT, SEMICONDUCTOR JUNCTIONS, MAGNETORESISTANCE, COLLISION AVOIDANCE, PHONONS, SPIN STATES, PHOTOVOLTAIC EFFECT, FABRICATION, SEMICONDUCTORS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2305ES, Mesoscopic structures, High magnetic fields, Modulated channels, Coulomb coupled quantum dot systems, Transmission

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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resonances, Lateral quantum wires, Quantum magnetotransport, Magnetoelectric states, Electromigration, Hot electron transport, Quantum structures, Quantum transport

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Smart Spatial Light Modulator Research and Development.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 92-28 Feb 93.

FEB 93 30P

PERSONAL AUTHORS: Lee, Sing H.

CONTRACT NO. F48820-92-J-0487

MONITOR: AFOSR, XC
TR-93-0353, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of our research is to demonstrate 'smart' spatial light modulators (S-SLM) where electronic logic circuits are combined with light modulators and detectors. Our previous studies, while providing valuable insights, indicated that shortcomings of certain approaches limit their applicability to combine Si-based driver and logic circuits with PLZT modulators. For example, PLZT substrate damage limited laser recrystallization approach. Lastly, voltage compatibility problem exists that imposes difficulties in the integration of the modulator driver circuit (requiring 30-50V) in the Si-wafer containing logic circuits (operating at 5V). In order to resolve these limitations we explored (1) two methods of implementing thin films of Si-band driver circuits directly onto PLZT substrates and (2) flip-chip bonding of Si wafer containing detector and logic circuits onto the silicon bonded directly to bulk PLZT substrate for fabrication of S-SLM.

DESCRIPTORS: (U) *LIGHT MODULATORS, *OPTICAL CIRCUITS, *LOGIC CIRCUITS, *METAL OXIDE SEMICONDUCTORS, *THIN FILMS, TRANSISTORS, SILICON, WAFERS, OPTICAL DETECTORS, SUBSTRATES, BONDING, FABRICATION, ELECTROOPTICS, FLIP CHIPS, ELECTROPLATING.

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AD-A264 928

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AD-A264 881 CONTINUED

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF BIOLOGY

IDENTIFIERS: (U) PE81102F, WUAFQSR2312CS, Retinal disorders, Retinal rods, Retinal cones, Homozygous mutants.

(U) Photoreceptors Regulating Circadian Behavior: A Mouse Model.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 92-14 Mar 93.

MAR 93 19P

PERSONAL AUTHORS: Foster, Russell G.

CONTRACT NO. F49620-92-J-0205

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0352, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our recent studies have examined circadian photoreception in mice with hereditary retinal disorders (rd/rd and rds/rds). Despite the loss of visual function in these mice, circadian responses to light remain unaffected. Using c-fos expression within the SCN as a marker of neural activation of the circadian entrainment pathway, we find identical levels of Fos in the SCN of rd/rd and +/- mice in response to retinal illumination. On the basis of action spectrum studies, and measurements of photopigment retinoids using HPLC, we believe the photopigment mediating circadian responses to light is based upon an opsin, and that 11-cis-retinaldehyde is the photopigment chromophore. Preliminary measurements of mouse rod opsin, blue cone, and green/red cone opsin mRNA in retinally degenerate mice suggest that none of these opsins are exclusively used to mediate circadian responses to light. Collectively our data suggest that circadian photoreception can be maintained by a very small number of rod or cone cells without outer segments, or alternatively, is performed by an unrecognized class of photoreceptive cell within the mammalian retina.

DESCRIPTORS: (U) *GENETICS, *CIRCADIAN RHYTHMS, PHOTORECEPTORS, MICE, RETINA, RESPONSE(BIOLOGY), RIBONUCLEIC ACIDS, OSCILLATORS, NERVE CELLS, SIGNALS.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

AD-A264 872 12/8 20/6.1

AD-A264 869 6/4

TEXAS TECH UNIV LUBBOCK DEPT OF ELECTRICAL ENGINEERING

SOCIETY FOR RESEARCH ON BIOLOGICAL RHYTHMS
CHARLOTTESVILLE VA

(U) Accuracy Enhancement in Optical Computing.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 92-28 Feb 93,

MAR 93 38P

PERSONAL AUTHORS: Walkup, John F.; Krille, Thomas F.

CONTRACT NO. AFOSR-91-0192

PROJECT NO. 2305

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0354, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigations of techniques for describing and enhancing the accuracy of optical linear algebra processors have been conducted. Significant accomplishments include: (1) development and simulation of a system model incorporating device dynamic range for better quantitative assessment of error-correction code performance; (2) extension of earlier statistical models to include crosstalk, background, avalanche gain, flicker and generation-recombination noise effects; (3) construction of the Optical Analysis Simulation Interactive System (OASIS) software for the acquisition, analysis and manipulation of experimental data and (4) identification of major noise sources of experimental concern using OASIS.

DESCRIPTORS: (U) *COMPUTERS, *OPTICAL CIRCUITS, *DATA PROCESSING, OPTICAL EQUIPMENT, ACCURACY, OPTICAL PROCESSING, LINEAR ALGEBRA, ERROR CORRECTION CODES, COMPUTER PROGRAMS, NOISE REDUCTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305DS, Optical computing.

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(U) Meeting of the Society for Research on Biological Rhythms (2nd) Held in Jacksonville, Florida on 9-13 May 1990. Programs and Abstracts.

DESCRIPTIVE NOTE: Final rept. 1 Mar 92-1 Mar 93,

APR 93 121P

PERSONAL AUTHORS: Turek, Fred W.

CONTRACT NO. F49620-92-J-0181

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0345, AFOSR

UNCLASSIFIED REPORT.

ABSTRACT: (U) From May 8-10, 1992, the Society for Research on Biological Rhythms held its third meeting at Amelia Island Plantation, Florida. The Society was formed in 1987 to promote the advancement of basic and applied research in all aspects of biological rhythms, to disseminate important research results concerning biological rhythms to the general public, to develop and enhance the education and training of students and researchers in the field and to foster interdisciplinary communication. This third meeting was successful in meeting the goals of the Society, particularly in the area of interdisciplinary communication. Researchers in the field of Biological Rhythms tend to be fragmented into many disciplines and are often divided along many different lines. One way of dividing the field is along frequency lines; while some workers study biological rhythms with a period of msec, others are interested in rhythms with periods in the range of minutes, hours (i.e. ultradian or pulsatile), a day (i.e. circadian) or a year (i.e. seasonal or circannual). The field is also divided along the lines of the major disciplines within biology since rhythms biologists can be either biochemists, molecular/cellular biologists, system physiologists, behaviorists and/or ecologists. In addition, while many

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workers study the basic biological mechanisms involved in generating rhythmicity, others are interested in the clinical applications of a better understanding of biological rhythmicity. Even within the clinical field, researchers fall into many traditional categories including psychiatry, endocrinology, neurology, oncology, cardiology and reproduction.

DESCRIPTORS: (U) *BIOLOGICAL RHYTHMS, ANIMALS, BIOSYNTHESIS, BRAIN, CIRCADIAN RHYTHMS, CLOCKS, COMPUTER APPLICATIONS, CONTROL, COUPLING(INTERACTION), DATA ACQUISITION, DISSECTION, ENDOCRINE GLANDS, GENETICS, IN VITRO ANALYSIS, MODULATION, NERVOUS SYSTEM, NEUROLOGY, OSCILLATORS, PACEMAKERS, PHOTOPERIODISM, PROTEINS, RETINA, SYMPOSIA, VERTEBRATES, ABSTRACTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312CS.

CITY COLL NEW YORK DEPT OF ELECTRICAL ENGINEERING
(U) Massively Parallel Spatial Light Modulation-Based Optical Signal Processing.

DESCRIPTIVE NOTE: Final rept. Jul 90-Sep 92.

MAR 93 5P

PERSONAL AUTHORS: LI, Yao

CONTRACT NO. AFOSR-88-0280

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR, XC
TR-93-0350, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new optical parallel arithmetic processing scheme using a nonholographic optoelectronic content-addressable memory (CAM) was proposed. The design of a four-bit CAM-based optical carry look-ahead adder was studied. Compared with existing optoelectronic binary addition approaches, this nonholographic CAM Scheme offers a number of practical advantages, such as faster processing speed and ease of optical implementation and alignment. For an addition of numbers longer than four bits, by incorporating the previous stage's carry, a number of four-bit CLA's can be cascaded. Experimental results were also demonstrated. One paper to the Optics Letters was published.

DESCRIPTORS: (U) *OPTICAL PROCESSING, *SIGNAL PROCESSING, PARALLEL PROCESSING, ANALOG TO DIGITAL CONVERTERS, COMPUTATIONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2305B4, *Optical signals, Optoelectronics, *Nonholography, CAM(Content Addressable Memory).

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AD-A264 839 5/1

GORDON RESEARCH CONFERENCES INC KINGSTON RI

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Gordon Research Conference On Pineal Cell Biology.

(U) Design Issues For High Performance Engineering Information Systems.

DESCRIPTIVE NOTE: Final progress rept. 15 Jul 91-14 Jul 92.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-30 Apr 92.

JUL 92 12P

APR 92 21P

PERSONAL AUTHORS: Zatz, Martin

PERSONAL AUTHORS: Roussopoulos, Nick; Sellis, Timos; Mark, Leo; Faloutsos, Christos

CONTRACT NO. AFOSR-81-0279

CONTRACT NO. AFOSR-88-0303

PROJECT NO. 2312

PROJECT NO. 2304

TASK NO. A3

TASK NO. A2

MONITOR: AFOSR, XC
TR-83-0217, AFOSRMONITOR: AFOSR, XC
TR-83-0210, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The objective of this conference was to bring together scientists so they could exchange recent research results and the conference provided a mechanism for the development of close interactions between these scientists. The quality of all of the lectures was exceptionally high and considerable discussion followed each lecture. Many of the conferees expressed very favorable comments about the intellectual stimulation provided by this conference.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, *CELLS(BIOLOGY), INTERACTIONS, LECTURES, QUALITY, GENETICS, MOLECULAR BIOLOGY, NEUROSPORA, DROSOPHILA, SYMPOSIA.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A3, *Pineal cell biology, Chronobiology

ABSTRACT: (U) It is increasingly being recognized that an Engineering Information System will be the fundamental component of any design and manufacturing system in the future and that all components in such a system have to be engineered around the management and control of information. Commercially available database systems do not meet the information and processing needs of design and manufacturing environments, consequently, extensions of database systems are necessary to realize Engineering Information Systems. These systems will support multimedia databases of significant size and complexity and, therefore, one of the most important issues is performance. Addressed in this project were the computational and architectural aspects of EIS and rule management techniques for maintaining consistency. The studies produced promising models and solutions.

DESCRIPTORS: (U) *SYSTEMS ENGINEERING, *MANAGEMENT INFORMATION SYSTEMS, CONSISTENCY, DATA BASES, ENVIRONMENTS, DATA PROCESSING, MANAGEMENT, MANUFACTURING, MODELS, PERFORMANCE(ENGINEERING).

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A2, EIS(Engineering Information Systems).

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AD-A264 836 5/8

CALIFORNIA INST OF TECH PASADENA

CASE WESTERN RESERVE UNIV CLEVELAND OH

(U) Conjugated Polymers from Cyclohexadienediol Monomers.

(U) Response Devices and Cognitive Tasks.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 81-30 Sep 82.

DESCRIPTIVE NOTE: Final technical rept. 15 Dec 88-14 Dec 92.

MAR 93 7P

MAR 93 24P

PERSONAL AUTHORS: Grubbs, Robert H.

PERSONAL AUTHORS: Detterman, Douglas K.

CONTRACT NO. AFOSR-88-0094

CONTRACT NO. AFOSR-80-0084

PROJECT NO. 2303

PROJECT NO. 2313

TASK NO. DS

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0216, AFOSRMONITOR: AFOSR, XC
TR-93-0215, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A novel, high yield synthetic scheme for poly(paraphenylene) starting from biologically produced cis-5,6-dihydroxy-1,3-cyclohexadiene has been developed in which trimethylsiloxy groups on the diol precursor polymer are quantitatively transformed to ester functionalities for facile cis-polyolytic elimination. The final pyrolysis step appears to be very sensitive to reaction conditions and additives, and can result in some degradation of the polymer backbone. The use of Lewis acid salts such as anhydrous zinc halides or Bronsted acids such as 3,4-dichlorobenzenesulfonic acid as aromatization catalysts has been found to lower the aromatization temperature and prevent degradation. The Lewis acid salt catalysts afford dark colored, tough films while the Bronsted acid catalysts afford light colored, malleable foams. Polyphenylenevinylene has also been prepared from cis-5,6-dihydroxy-1,3-cyclohexadiene through a precursor polymer route.

DESCRIPTORS: (U) *POLYMERS, ACIDS, CATALYSTS, DEGRADATION, ESTERS, FILMS, FOAM, HALIDES, MONOMERS, PRECURSORS, PYROLYSIS, SALTS, TEMPERATURE, YIELD, ZINC.

IDENTIFIERS: (U) Phenylene/poly paradiol/cyclohexadiene. PE61102F, WUAFOSR2303DS.

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ABSTRACT: (U) This report is for two years of research conducted primarily at the Air Force Armstrong Laboratory, Project Lamp. The aims of the research were to (1) study the effects of response mode and response complexity on basic cognitive tasks, and (2) to use the information obtained to develop more elaborated models of cognitive functioning which take these factors into account. Subjects were tested on a set of computer-administered cognitive tasks, using both keyboard and touchscreen response modes, and under varying sets of response load conditions. The results clearly show the response load has a substantial effect on the performance of cognitive tasks. A detailed investigation of the effects of response load in choice reaction time showed that Hick's Law, formerly attributed to cognitive decision factor related to task complexity, is largely due to response factors.

DESCRIPTORS: (U) *COGNITION, *RESPONSE, AIR FORCE, COMPUTERS, KEYBOARDS, LABORATORIES, LAMPS, MODELS, REACTION TIME, SELECTION, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7.

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CARNEGIE-MELLON UNIV PITTSBURGH PA

BENZOXAZOLES, CHAINS, CHEMICALS, CRYSTALS, CRYSTALS, DYNAMICS, LIGHT, LIQUID CRYSTALS, LIQUIDS, MIXTURES, MODELS, NYLON, OPTICS, PHASE, THIRD HARMONIC GENERATION, COMPOSITE MATERIALS, MESOMORPHIC COMPOUNDS, POLARIZATION, AXES, BLENDING.

(U) Physical Chemical Studies on Molecular Composite Compositions.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jul 92.

FEB 93 98P

IDENTIFIERS: (U) Rodlike polymer, Molecular composite, PEG1102F, WUAFOSR2303A3, *Nematic solutions, PBT(Poly Phenylene Benzobisthiazole), Flexibility, PBO(Poly Phenylene Benzobisoxazole), Pab80(Poly Benzoxazole), Poly(Hexamethylene Adipamide).

PERSONAL AUTHORS: Berry, Guy C.

CONTRACT NO. AFOSR-89-0208

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0208, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research in three areas is described: nonlinear optical (NLO) properties of nematic solutions of PBT; the refractive indices of nematic solutions of PBT-, and the rheological properties of blends of PBT and nylon-66, or PBO and Pab80, where PBT is trans-poly(1,4-phenylene-2,8-benzobisthiazole), PBO is cis-poly(1,4-phenylene-2,8-benzobisoxazole), Pab80 is poly(2,5-benzoxazole), and nylon-66 is poly(hexamethylene adipamide). Fully aligned monodomains of nematic solutions of PBT were used in the first two parts. An unexpected NLO behavior was observed in which the maximum NLO third-harmonic generation did not occur with light polarized along the molecular axis of the rodlike PBT, even though the refractive index is maximum for that case-possible reasons for this behavior are discussed. The rheology of miscible blends of the rodlike chains with flexible or semiflexible chains is discussed using a model accounting for constraints on the rodlike dynamics imposed by the flexible or semiflexible components. It is shown that information from phase equilibria is essential to such an analysis, as the dynamic constraints are correlated with the factors that cause the formation of the nematic phase in such blends.

DESCRIPTORS: (U) *NONLINEAR OPTICS, *POLYMERS, *REFRACTIVE INDEX, *RHEOLOGY, *MOLECULAR STRUCTURE,

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AD-A264 832 17/5 13/1 12/5

IOWA STATE UNIV AMES

ARIZONA UNIV TUCSON LUNAR AND PLANETARY LAB

(U) Computational Fluid Dynamics Research On Dynamically Adaptive Mesh Methods For Transonic Flows.

(U) Advanced Research In Sky Surveillance: A Search For Low-luminosity Objects.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-31 Dec 92.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-31 Oct 92.

NOV 92 48P

OCT 92 4P

PERSONAL AUTHORS: Hindman, Richard G.

PERSONAL AUTHORS: Gehrels, Tom

CONTRACT NO. AFOSR-90-0034

CONTRACT NO. F49620-92-J-0051

PROJECT NO. 2307

PROJECT NO. 2311

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0205, AFOSRMONITOR: AFOSR, XC
TR-93-0284, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Dynamic mesh adaptation strategies are investigated. These include software development, dynamically adaptive mesh schemes, errors arising from generalized mappings and orthogonality. The strategies developed are tested against the euler and viscous Burgers Equations.

ABSTRACT: (U) The new CCD was installed. Improvements were made in the software and in the operation and the system is working well. All through the year the telescope has been assigned for eighteen nights per month. Large numbers of main-belt asteroids have been found. It has been found that objects smaller than 2 meters occur two orders of magnitude more frequently than expected from extrapolation of the size-frequency relation of the larger near-Earth objects. The design of the new 1.8-meter Spacewatch Telescope has begun.

DESCRIPTORS: (U) *COMPUTATIONAL FLUID DYNAMICS, *TRANSONIC FLOW, ADAPTATION, DYNAMICS, EQUATIONS, ERRORS, FLUID DYNAMICS, FLUIDS, MESH, ORTHOGONALITY, STRATEGY, COMPUTER PROGRAMS, NUMERICAL METHODS AND PROCEDURES.

DESCRIPTORS: (U) *ASTEROIDS, *TELESCOPES, *COMPUTER

PROGRAMS, BELTS, CHARGE COUPLED DEVICES, EXTRAPOLATION, FREQUENCY, LUMINOSITY, NIGHT, NUMBERS, OPERATION, SKY, SURVEILLANCE.

IDENTIFIERS: (U) CFD, ADAPTATION, MESHES, Euler equations, Burgers equations, Adaptive meshes.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2311A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

IDENTIFIERS: (U) PE61102F, WUAFOSR2313CS, WUAFOSR701300.

(U) Development of Neural Network Architectures for Self-Organizing Pattern Recognition and Robotics.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 89-31 Dec 92.

MAR 93 27P

PERSONAL AUTHORS: Carpenter, Gail A.; Grossberg, Stephen

CONTRACT NO. AFOSR-90-0083

PROJECT NO. 2313, 7013

TASK NO. CS, OO

MONITOR: AFOSR, XC
TR-93-0274, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the DARPA ANNT Program Contract, new neural network architectures were developed to carry out autonomous real-time preprocessing, segmentation, recognition, timing, and control of both spatial and temporal inputs. These architectures contribute to: (1) preprocessing of visual form and motion signals; (2) preprocessing of acoustic signals; (3) adaptive pattern recognition and categorization in an unsupervised learning context; (4) adaptive pattern recognition and prediction in a supervised learning context; (5) processing of temporal patterns using working memory networks, with applications to 3-D object recognition; (6) adaptive timing for task scheduling; (7) adaptive sensory-motor control using head-centered spatial representations of 3-D target position.

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *PATTERN RECOGNITION, *ROBOTICS, ACOUSTIC SIGNALS, ACOUSTICS, CONTRACTIONS, CONTROL, HEAD(ANATOMY), INPUT, LEARNING, MOTION, MOTORS, NETWORKS, NEURAL NETS, PATTERNS, PREDICTIONS, PREPROCESSING, PROCESSING, REAL TIME, RECOGNITION, SCHEDULING, SIGNALS, TARGETS, TIME, SIGNAL PROCESSING, COMPUTER VISION, LEARNING MACHINES, DEPTH, PERCEPTION, MEMORY DEVICES, ADAPTIVE CONTROL SYSTEMS.

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STANFORD UNIV CA COMPUTER SYSTEMS LAB

(U) Intelligent Real-time Problem Solving.

DESCRIPTIVE NOTE: Final rept. 15 Mar 91-14 Sep 92.

SEP 92

8P

PERSONAL AUTHORS: Shoham, Yoav

CONTRACT NO. AFOSR-91-0205

PROJECT NO. 5581

TASK NO. 00

MONITOR: AFOSR, XC
TR-93-0288, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The researchers proposed to develop and test a framework for designing and analyzing complex control systems consisting of independent modules, called agents, that communicate through fixed channels. These agents possess and acquire knowledge, and negotiate with one another regarding the use of their capabilities. The results were along the following dimensions: real-time, machine, and environments; agent-oriented programming; temporal data bases; anytime belief update; planning and control; social rules, utilities and organizations.

DESCRIPTORS: (U) *PROBLEM SOLVING, *REAL TIME, *COMPUTER COMMUNICATIONS, *SYSTEMS ENGINEERING, CHANNELS, COMPUTER PROGRAMMING, CONTROL SYSTEMS, DATA BASES, ENVIRONMENTS, MACHINES, ORGANIZATIONS, PLANNING, TEST AND EVALUATION, TIME, SYSTEMS ANALYSIS.

IDENTIFIERS: (U) WUAFOSR558100.

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NEW YORK MEDICAL COLL NY DEPT OF PHYSIOLOGY

(U) Biophysical And Biochemical Mechanisms In Synaptic Transmitter Release.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 92-31 May 93,

APR 92 4P

PERSONAL AUTHORS: Llinas, Rodolfo R.

CONTRACT NO. F49620-92-J-0383

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0281, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Three areas of research were implemented experimentally in the summer of 1992. (1) further description of calcium microdomains and their role in synaptic transmission; (2) a morphological analysis of rat synaptic vesicles injected into presynaptic terminal of the squid; and (3) the effect of Brefeldin A (BFA) on the distribution and size of synaptic vesicles.

DESCRIPTORS: (U) *SYNAPSE, CALCIUM, CEPHALOPODA, DISTRIBUTION, RATS, RELEASE, SUMMER, TERMINALS, TRANSMITTERS, NERVE TRANSMISSION, BIOPHYSICS, BIOCHEMISTRY, CHANNELS, DEMONSTRATIONS, GRANTS, INJECTION, NERVE CELLS, PHOSPHORUS TRANSFERASES, PROTEINS, POTENTIAL ENERGY.

IDENTIFIERS: (U) PE81102F, WUAFOSR23128S, Synaptic transmitter release.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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CORNELL UNIV ITHACA NY LAB OF PLASMA STUDIES

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Novel Methods of Acceleration.

(U) Detailed Studies of Soot Formation in Laminar Diffusion Flames for Application to Modeling Studies.

DESCRIPTIVE NOTE: Final rept. 1 Feb 92-31 Jan 93,

JAN 93 25P

DESCRIPTIVE NOTE: Annual rept. 1 Feb 92-31 Jan 93,

PERSONAL AUTHORS: Nation, John A.

MAR 93 52P

CONTRACT NO. F49620-92-J-0153

PERSONAL AUTHORS: Santoro, Robert J.

PROJECT NO. 2301

CONTRACT NO. AFOSR-90-0285

TASK NO. ES

PROJECT NO. 2308

MONITOR: AFOSR, XC
TR-93-0276, AFOSR

MONITOR: AFOSR, XC
TR-93-0285, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes work carried out on AFOSR grant number F49620-92-J-0153DEF during the period February 1 1992 to January 31 1993. The report provides a brief description of the program objectives, summarizes the main accomplishments during the last year and concludes with listings of conferences and refereed publications, which have either been submitted for publications or published during the program year.

DESCRIPTORS: (U) *ELECTRICAL ENGINEERING, *PLASMAS(PHYSICS), ACCELERATION, SYMPOSIA, TRAVELING WAVE TUBES, AMPLIFIERS, ELECTRON ACCELERATORS, OSCILLATORS, NARROWBAND, ELECTRON BEAMS, MODULATORS.

IDENTIFIERS: (U) WUAFOSR2301ES.

ABSTRACT: (U) A study of soot particle formation in laminar diffusion flames has been undertaken to investigate soot precursor chemistry, particle inception and surface growth phenomena. During the first year of this study emphasis has been given to species concentrations measurements made using mass spectrometric techniques. These measurements have demonstrated that species measurements can be obtained in particle laden regions of diffusion flames using a novel sampling probe approach. In particular, measurements have been obtained of acetylene, diacetylene, benzene and stable combustion products throughout methane/air and ethene/air laminar diffusion flames. Combining these measurements with previous soot particle and velocity field measurements it has been possible to follow the soot growth process along individual particle paths. These results establish that soot particle growth ceases due to the depletion of growth species not through the loss of soot particle reactivity as observed in premixed flame studies. Similarly, laser-induced fluorescence measurements of polynuclear aromatic hydrocarbons have been undertaken to follow the evolution of the soot precursor field. These measurements have established that laser-induced fluorescence can be used to reveal the qualitative structure of the molecular growth process leading to soot

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particle formation. These results need to be extended to provide more quantitative comparisons, particularly regarding fuel structure effect. Additional studies have been carried out to characterize the effects of aggregates on the interpretation of light scattering measurements. The results of these studies have shown that through the incorporation of fractal analysis a self-consistent treatment of aggregates can be incorporated into the light scattering analysis

DESCRIPTORS: (U) *DIFFUSION, *PARTICLES, ACETYLENES, AIR, AROMATIC HYDROCARBONS, BENZENE, CHEMISTRY, COMBUSTION PRODUCTS, COMPARISON, DEPLETION, FLAMES, FRACTALS, FUELS, LASER INDUCED FLUORESCENCE, LIGHT SCATTERING, MEASUREMENT, METHANE, PRECURSORS, PROBES, REACTIVITIES, SAMPLING, SOOT, STRUCTURES, SURFACES, VELOCITY, MODELS, MASS SPECTROMETRY, MOLECULAR STRUCTURE, LAMINAR FLOW.

IDENTIFIERS: (U) *Soot formation, PE81102F, WJAFOSR2308BS, *Laminar, *Formation, Ethene, Polynuclear.

HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY

(U) Forms Of Memory For Representation Of Visual Objects.

DESCRIPTIVE NOTE: Final rept. 15 Feb 91-14 Feb 93.

FEB 91 21P

PERSONAL AUTHORS: Schacter, Daniel L.

CONTRACT NO. AFOSR-91-0182

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XC
TR-93-0275, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has attempted to elucidate the representations and processes involved in implicit and explicit memory for novel visual objects. Experiments have been conducted that (1) clarify the effects of structural and functional encoding manipulations on priming and explicit memory, (2) track the properties of the observed priming effects over time and repetition, (3) specify the nature of the structural representation that underlies priming effects on the objects decision task, (4) extend findings on priming of novel objects to new materials and paradigms, and (5) elucidate the extent to which implicit memory for novel objects is spared in subject populations with explicit memory deficits. We summarize the procedures and results from each of these five lines of research.

DESCRIPTORS: (U) *VISUAL PERCEPTION, *MEMORY(PSYCHOLOGY), CODING, MATERIALS, POPULATION, TIME, TRACKS.

IDENTIFIERS: (U) PE81103D, WJAFOSR3484HS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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BOWMAN GRAY SCHOOL OF MEDICINE WINSTON-SALEM NC

IDENTIFIERS: (U) WUAFOSR3484HS, PE81103D.

(U) Multiple Neuron Recording in the Hippocampus of Freely Moving Animals.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 91-30 Nov 92.

MAR 93 8P

PERSONAL AUTHORS: Deadwyler, Sam A.

REPORT NO. BGSM-PP-92-001

CONTRACT NO. AFOSR-90-0092

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XC
TR-93-0285, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress has been significant over the previous year on the development of multineuronal recording and systems for analysis of the multineuronal data. This was a primary objective of the three laboratory consortium, and it has been a principle focus of the research efforts. The multitasking computer system has been in operation in all three laboratories this past year, as well as the DSP-based multineuron spike-sorter and the associated software interface for neural spike discrimination. Much of the research effort in the past year has been directed toward implementing the spike-sorter system, collecting multineuron data, and developing the analysis strategies. In addition, studies using the multineuron data acquisition have revealed new relationships between the behavioral events in the DMTS and patterns of simultaneously active neurons in the hippocampus. The following report will summarize these and other accomplishments in the third year of the award.

DESCRIPTORS: (U) *HIPPOCAMPUS, *NERVE CELLS,
*NEUROPHYSIOLOGY, ANIMALS, COMPUTERS, DETECTION,
DOCUMENTS, LABORATORIES, PHASE, RECORDING SYSTEMS, SIGNAL
PROCESSING.

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TRISTAN TECHNOLOGIES SAN DIEGO CA

(U) Large Array SQUID Magnetometer for NDE.

IDENTIFIERS: (U) WJAFOSR180204, SQUID(Superconducting Quantum Interference Device), SQUID Magnetometers.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 92-1 Apr 93,

APR 93 18P

PERSONAL AUTHORS: Paulson, Douglas N.

CONTRACT NO. F49620-92-C-002A

PROJECT NO. 1802

TASK NO. 04

MONITOR: AFOSR, XC
TR-93-0348, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Tristan Technologies, Inc. is working to apply SQUID magnetometry to problems in nondestructive evaluation which are important to the Strategic Defense Initiative. We have designed and are nearing completion of an innovative Non Destructive Evaluation (NDE) instrument that, unlike most existing instruments, can be used for studying deep sources with applied fields. We will assess the effectiveness of this SQUID NDE system for a broad range of nondestructive evaluation problems related to high-performance aircraft bearings, nuclear reactor fuel tubes, titanium billets for aircraft turbine blades, high-temperature superconducting magnetic shields, and riveted joints in military and commercial aircraft. In various applications, SQUID magnetometers could facilitate the development of high-performance devices, reduce manufacturing costs, monitor performance and assure quality control in manufacturing, and help prevent catastrophic failures of aircraft, satellites, weapons and other military systems. During Phase III we will design and commercialize instruments specifically to meet the most promising NDE applications for SQUID magnetometers.

DESCRIPTORS: (U) *MAGNETOMETERS, *NONDESTRUCTIVE TESTING, QUANTUM ELECTRONICS, SUPERCONDUCTIVITY, AIRCRAFT, BEARINGS, NUCLEAR REACTORS, REACTOR FUELS, TUBES, TITANIUM, TURBINE BLADES, SHIELDING, RIVETED JOINTS.

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AD-A284 780 CONTINUED

WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY

PARAMETERS, PRODUCTION, RATES, TEMPERATURE, VOIDS, REPRINTS.

(U) Thermal Decomposition of Ultrathin Oxide Layers on Si(100).

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2, Ultrathin.

AUG 92 9P

PERSONAL AUTHORS: Sun, Y. K.; Bonser, D. J.; Engel, Thomas

CONTRACT NO. AFOSR-91-0123

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC
TR-93-0330, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Vac. Sci. Technol. A, v10 n4 p2314-2321, Jul/Aug 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Decomposition of ultrathin oxide layers on Si(100) has been studied using isothermal desorption, temperature programmed desorption and readsorption on partially desorbed layers using isotopically labeled oxygen. We find that inhomogeneous decomposition, with void formation in which clean silicon is exposed, occurs at coverages as low as 0.3 monolayers. Whereas the activation energy for SiO(g) formation is essentially independent of coverage between 10 (exp-3) and 10 monolayers, the apparent preexponential factor decreases substantially with increasing coverage. The discrepancy between the kinetic parameters measured for SiO(g) production in modulated molecular beam experiments and those measured using temperature programmed desorption is attributed to a strong decrease in the rate constant for desorption of SiO(g) with increasing coverage. Both methods give similar results at nearly identical coverages. Ultrathin oxide layers on silicon. Thermal decomposition of ultrathin oxide.

DESCRIPTORS: (U) *DECOMPOSITION, *LAYERS, *OXIDES, *SILICON, *THERMAL PROPERTIES, ACTIVATION ENERGY, CONSTANTS, DESORPTION, KINETICS, MOLECULAR BEAMS, OXYGEN.

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PRINCETON UNIV NJ DEPT OF CHEMISTRY

MOLECULAR ORBITALS, OPTICAL PROPERTIES, POLYMERS,
TRANSITION METALS, WORK, PHYSICAL PROPERTIES,
ORGANOMETALLIC COMPOUNDS, MOLECULAR STRUCTURE, SOLID
STATE CHEMISTRY, ELECTRONS, MOLECULAR PROPERTIES, CRYSTAL
STRUCTURE.

(U) Organometallic Compounds and Polymers with Second and
Third Order Nonlinear Optical Properties.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Nov 92.

MAY 93 18P

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3.

PERSONAL AUTHORS: Thompson, Mark E.

CONTRACT NO. AFOSR-90-0122

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-83-0343, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The chemistry carried out with AFOSR support was aimed at exploring new materials with potentially interesting nonlinear optical properties. All of our work involved transition metal complexes. In these materials we can alter either the metal ion or the ligands independently. In this way it is possible to alter the electronic properties of a given complex without altering its molecular or solid-state structure. Second and third order NLO properties were investigated in these materials. Both molecular and bulk nonlinearities were examined as second order candidates, while only molecular nonlinearities were examined for the third order materials. Second order properties in coordination compounds were found to scale \propto approx. $> 5 \text{ Fe} > \text{Co}$ Polar coordination polymers were prepared in which excellent polar order was found in the polymeric chains, however, the adjacent chains pack antiparallel in the crystal leading to no bulk second order activity. Group 4 organometallic complexes were examined for their third order properties. Here the order based on metal was found to be $\text{Ti} > \text{Zr} > \text{Hf}$. The nonlinearity is thought to arise from extended molecular orbitals.

DESCRIPTORS: (U) *METAL COMPLEXES, *OPTICAL MATERIALS,
*NONLINEAR OPTICS, CHEMISTRY, CRYSTALS, IONS, LIGANDS,

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(J) Photochemistry of Alpha-(o-Tolyl) Acetone and Some Derivatives: Triplet Alpha-Cleavage and Singlet Hydrogen Abstraction.
IDENTIFIERS: (U) PE61102F, WJAFOSR230382, MBK(Mesitylmethyl Benzyl Ketone), TBK(Tolymethyl Benzyl Ketone), Indanol, Hydrogen abstraction

APR 93 7P

PERSONAL AUTHORS: Noh, Taehee; Lei, Xue-Gong; Turro, Nicholas J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0342, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. American Chemical Society, V115 p3105-3110 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Photolysis of alpha-(o-tolyl)acetone (TA) in 2-propanol was reported not to produce the indanol product expected from delta-hydrogen abstraction and cyclization of the resulting 1,5-biradical. A reinvestigation of this reaction reveals that the photolysis of solutions of TA does produce an indanol, albeit as a minor product. Similarly, photolysis of benzene solutions of o-tolymethyl benzyl ketone (TBK) and o-tolymethyl cyclohexyl ketone (TCK) results in the formation of indanols as minor products (ca. 5-10%). However, the photolysis of mesitylmethyl benzyl ketone (MBK) yields an indanol in significant yield (ca. 40%). In all cases, the diphenylethanes (DPEs) expected from free-radical recombination of benzylic radicals produced by alpha-cleavage are produced as dominant products. In order to determine the synthetic limitations of indanol formation from the photolysis of alpha-(o-tolyl)acetones, the mechanism of these photolysis was investigated.

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *PHOTOLYSIS, *ACETONES, ISOPRENE, REPRINTS.

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PRINCETON UNIV NJ

materials, devices, circuits and systems which make use of the family of novel devices which are based on the optical powering concept. Smart pixels, Optoelectronic integrated circuits, Spatial light modulators

(U) Optically Powered, Optoelectronic Spatial Light Modulators.

DESCRIPTIVE NOTE: Annual technical rept. 1 Aug 92-31 Jan 93,

DESCRIPTORS: (U) *LIGHT MODULATORS, *PIXELS, *ELECTROOPTICS, BANDWIDTH, CELLS, CHANNELS, CLOCKS, CONTROL, DEMONSTRATIONS, ELECTRONICS, FABRICATION, HIGH DENSITY, INTEGRALS, INTEGRATED CIRCUITS, INTEGRATION, LIGHT, LIGHT SOURCES, MATERIALS, OPTICAL DATA, PACKAGING, POWER, PROBES, SIGNALS, VERY LARGE SCALE INTEGRATION.

APR 93 110P

PERSONAL AUTHORS: Forrest, Stephen R.

CONTRACT NO. F48620-92-J-0432

IDENTIFIERS: (U) WUAFOSR2301DS, *Optoelectronics, Photovoltaics.

PROJECT NO. 2301

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0351, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We describe a program which endeavors to make significant progress towards the realization of very high density, fast, InP-based optoelectronic spatial light modulators (SLMs). The central concept of the devices is to eliminate as many contacts to the SLM as possible by supplying integral, local circuit power and control via the connection of the active circuit to integrated photovoltaic (PV) cells. Power to the circuits is thereby supplied by a bright light source operating at a different wavelength than the optical data channel. The SLM will be fabricated in InP-based materials due to the ease of integration of photovoltaic cells (used in providing circuit power and control), with high bandwidth transceiver optoelectronic integrated circuits (OEICs). Work includes materials and device fabrication, packaging and systems demonstrations. In addition to applications in optical interconnection and optical computing, such contactless circuit concepts can also be applied to many diverse systems such as for providing highly synchronous optical clock signals on VLSI chips, and for powering OEICs placed at the end of remote probes where size, power, and environmental restrictions prohibit the placement of the power source adjacent to the active electronics. We are engaged in a broad program directed at investigating the fundamental limits confronting

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SEARCH CONTROL NO. T4155F

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AD-A264 758 4/1

MOSES-APPLIMATH (HARRY E) CO BROOKLINE MA

SRI INTERNATIONAL MENLO PARK CA

(U) Research on Acoustic Coupling to Electromagnetic Pulses in Tissue.

(U) Mithras Studies of the Boundary Between Open and Closed Field Lines.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 93,

DESCRIPTIVE NOTE: Annual rept. 1 Dec 91-30 Nov 92.

APR 93 4P

MAR 93 8P

PERSONAL AUTHORS: Moses, Harry

PERSONAL AUTHORS: DE LA Beaujardiere, Odile

CONTRACT NO. F49620-88-C-0070

CONTRACT NO. F49620-92-C-0011

PROJECT NO. 7757

PROJECT NO. 2310

TASK NO. 00

TASK NO. BS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC
TR-93-0334, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) Over the course of the contract Dr. Moses published 12 papers with one still pending. His work on novel electromagnetic wave propagation, together with insights regarding possible transmitters, is nothing short of terminal. Dr. Moses was the first to rigorously characterize the universal character of far field patterns produced by a source that operated over a finite time frame. Such patterns could be 'requested' and then the design/operating procedure of the source would be the fundamental unknown. Such possibilities were communicated to government lab researchers at AL (Brooks AFB) and subsequent work will be pursued by them and Dr. Moses.

DESCRIPTORS: (U) *ELECTROMAGNETIC WAVE PROPAGATION, *ELECTROMAGNETIC PULSES, FAR FIELD, ENERGY TRANSFER, COSTS, FRAMES, PATTERNS, PROPAGATION, TRANSMITTERS, TISSUES(BIOLOGY), LABORATORIES, MONITORING, THREE DIMENSIONAL.

IDENTIFIERS: (U) WUAFOSR775700, *Acoustic coupling, Electromagnetic bullets, Acoustic bullets, Sound pulses.

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ABSTRACT: (U) The coupling between the solar wind, the magnetosphere, and the ionosphere was studied using data from multi-instrument campaigns. One study showed that, even under quiescent conditions, the polar cap boundary was quite active. Repeated disturbances in particle precipitation and electric field were observed at intervals of 10 to 20 minutes. Some of these perturbations propagated westward at a velocity of around 1000 m/s. It was argued that these perturbations are the ionospheric signature of rapid increases in the midnight-sector magnetic reconnection. In a separate study, the transition from active to quiet conditions was examined. The interplanetary magnetic field northward component switched suddenly from a northward to a southward orientation. The ionosphere responded within about two minutes: the electric field intensity diminished, and the F-region large and small scale irregularities changed dramatically. This response time is much shorter than had previously been assumed.

DESCRIPTORS: (U) *IONOSPHERE, *MAGNETOSPHERE, BOUNDARIES, COUPLINGS, ELECTRIC FIELDS, F REGION, FIELD INTENSITY, INTENSITY, INTERVALS, MAGNETIC FIELDS, PARTICLES, PERTURBATIONS, POLAR CAP, PRECIPITATION, QUIET, REGIONS, RESPONSE, SCALE, SIGNATURES, SOLAR WIND, TIME, TRANSITIONS, VELOCITY, WIND.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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MASSACHUSETTS UNIV AMHERST

IDENTIFIERS: (U) PE81102F, WUAFDSR231085.

(U) Adaptive Networks For Sequential Decision Problems.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-28 Sep 92.

SEP 92 14P

PERSONAL AUTHORS: Barto, Andrew

CONTRACT NO. AFOSR-89-0528

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0208, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Considerable progress was made in developing artificial neural network methods for solving stochastic sequential decision problems. The research focused on reinforcement learning methods based on approximating dynamic programming (DP). They used problems in the domains of robot fine motion control, navigation, and steering control in order to develop and test learning algorithms and architectures. Although most of these problems were simulated, they also began to apply DP-based learning algorithms to actual robot control problems with considerable success. Progress was made on reinforcement learning methods using continuous actions, modular network architectures, and architectures using abstract actions. Theoretical progress was made in relating DP-based reinforcement learning algorithms to more conventional methods for solving stochastic sequential decision problems. As a result of this research there is an improved understanding of these algorithms and how they can be successfully used in applications.

DESCRIPTORS: (U) *DYNAMIC PROGRAMMING, *NEURAL NETS, ABSTRACTS, ALGORITHMS, ARCHITECTURE, COMPUTER PROGRAMMING, CONTROL, DYNAMICS, LEARNING, MOTION, NAVIGATION, ROBOTS, STEERING, TEST AND EVALUATION, SYSTEMS ENGINEERING.

IDENTIFIERS: (U) WUAFDSR230583.

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NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF ELECTRICAL
ENGINEERING

YALE UNIV NEW HAVEN CT DEPT OF COMPUTER SCIENCE

(U) Atomic Layer Epitaxy of Semiconductor Heterostructures.

(U) The 1991 Neural Information Processing Systems-natural
& Synthetic.

DESCRIPTIVE NOTE: Final rept. 15 Sep 91-14 Sep 92.

DESCRIPTIVE NOTE: Final rept. 30 Se 91-29 Sep 92.

NOV 92 43P

FEB 93 24P

PERSONAL AUTHORS: Bedatir, Salah

PERSONAL AUTHORS: Moody, John

CONTRACT NO. AFOSR-91-0422

CONTRACT NO. AFOSR-91-0438

PROJECT NO. 2305

PROJECT NO. 2305

TASK NO. B1

TASK NO. B3

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0244, AFOSR

TR-93-0271, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) AlGaP and GaP films were deposited on the (100) Si substrates by Atomic Layer Epitaxy (ALE) in the temperature range between 450 and 600 deg C. Under optimum growth conditions, the growth of GaP and AlGaP was observed to proceed in a two-dimensional (2-D) fashion in the initial growth stages. These ALE-grown films have better surface morphology when compared with the corresponding MOCVD-grown films. With an AlGaP buffer layer grown on Si, the subsequent growth of GaAs on the AlGaP-coated Si substrates tends to proceed 2-D growth. This avoids island growth and the two-step growth process currently used.

DESCRIPTORS: (U) *LAYERS, *SEMICONDUCTORS, *ATOMIC STRUCTURE, *EPITAXIAL GROWTH, BUFFERS, FILMS, GALLIUM ARSENIDES, MORPHOLOGY, SILICON, SUBSTRATES, SURFACES, ALUMINUM, PHOSPHIDES, MORPHOLOGY, COATINGS, VAPOR DEPOSITION, CHEMICAL REACTIONS, GALLIUM PHOSPHIDES, TEMPERATURE, TWO DIMENSIONAL.

IDENTIFIERS: (U) WUAFOSR2305B1, Heterostructure, MOCVD(Metal-Organic Chemical Vapor Deposition), Aluminum gallium phosphide, Island growth.

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AD-A264 751 7/8 20/3 9/5 20/8

FLORIDA UNIV GAINESVILLE

EIC LABS INC NORWOOD MA

(U) Development of an O Atom Gun.

(U) Optically Switchable Conductive Polymers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 81-31 Aug 82.

DESCRIPTIVE NOTE: Final rept. 15 Jun-14 Dec 82.

MAR 83 24P

FEB 93 158P

PERSONAL AUTHORS: Hoflund, Gar B.

PERSONAL AUTHORS: Rose, Timothy L.; Kon, Allan B.

CONTRACT NO. F49620-81-C-0087

CONTRACT NO. F49620-82-C-0041

PROJECT NO. 2303

PROJECT NO. 1602

TASK NO. BS

TASK NO. 01

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0219, AFOSR

TR-93-0288, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this project was to produce a source which is compact, durable and mounts on a standard UHV flange for the generation of hyperthermal oxygen atoms. This has been accomplished. In this source oxygen atoms permeate through a Ag membrane held at 500 deg C and are then emitted toward the target from the vacuum side of the membrane by electron stimulated desorption (ESD). The current prototype model generates usable 0-atom fluxes of about 10(exp 12) atoms/sq cm/s, and future modifications should increase this flux by 1 to 3 orders of magnitude. Based on the 0+ energy distribution, the average 0 neutral energy is about 5 eV with a fairly broad distribution (FWHM approx. equal 3.6 eV). The information required for the development of this source and a design of the source are presented.

DESCRIPTORS: (U) *ATOMS, *GUNS, *OXYGEN, DESORPTION, ELECTRONS, ENERGY, FLANGES, MEMBRANES, MODELS, MODIFICATION, MOUNTS, NEUTRAL, PROTOTYPES, STANDARDS, TARGETS, THERMAL PROPERTIES, SILVER ALLOYS, ULTRAHIGH VACUUM, SPACECRAFT, SEMICONDUCTORS.

IDENTIFIERS: (U) Hyperthermal, ESD(Electron Stimulated Desorption), Ag, Corrosion materials.

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ABSTRACT: (U) The objectives of the project were to synthesize and characterize a polymer which could be switched to its conductive state by intramolecular electron transfer initiated by absorption of light. By covalently bonding the electron donating moiety to the polymer, the rate of switching should be fast and uniform giving it potential applications in optical processing devices. The initial polymer system selected was a polythiophene substituted at the 3 position with a diphenyliodonium salt. Photodissociation of diphenyliodonium chloride in physical contact with the polymer formed the highly oxidizing phenyliodonium radical cation which in turn oxidized the polythiophene backbone. Several approaches tried to synthesize the covalently bound substituted polythiophene were unsuccessful. Polymerization of 3-ferrocenylpyrrole, which also has potential photodoping properties, was also unsuccessful.

DESCRIPTORS: (U) *POLYMERS, *CONDUCTIVITY, *OPTICAL SWITCHING, ABSORPTION, BONDING, CATIONS, CHLORIDES, ELECTRON TRANSFER, ELECTRONS, FILMS, LIGHT, OPTICAL PROCESSING, PHOTODISSOCIATION, POLYMERIZATION, PROCESSING, RATES, SALTS, THIOPHENES, MOLECULAR STATES, COVALENT BONDS, ELECTRON DONORS, THIOPHENES, PYRROLES, IRON, IODINE COMPOUNDS, PHENYL RADICALS.

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SEARCH CONTROL NO. T4155F

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IDENTIFIERS: (U) Conducting Polymer, Polythiophene,
Photodope, Iodinium Salt, Films, PE83218C, WUAFOSR160201,
3-Ferrocenylpyrroles.

UTAH STATE UNIV LOGAN

(U) USU Center of Excellence in Theory and Analysis of the
Geo-Plasma Environment.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-30 Sep 92.

FEB 93 33P

PERSONAL AUTHORS: Schunk, Robert W.

CONTRACT NO. AFOSR-90-0026

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XC
TR-93-0204, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A team of ten Ph.D. scientists and several graduate students was assembled at USU to work in close collaboration with scientists at the Air Force Geophysics Laboratory on a number of problems that are relevant to Air Force systems, including OTH radars, communications, and orbiting space structures. The overall goal of the research was to obtain a better understanding of the basic chemical and physical processes operating in the geoplasmic environment, including the ionosphere, thermosphere, and magnetosphere. Some of the specific tasks included the following: (1) Studies of ionospheric structure and irregularities; (2) Study the feasibility of developing better operational ionospheric models; (3) Conduct model/data comparisons in order to validate the ionospheric models; (4) Study plasma electrodynamics in the high latitude ionosphere; (5) Study magnetosphere-ionosphere coupling problems; (6) Continue the development of a thermospheric circulation model; (7) Study plasmasphere refilling problems; (8) Study OTH ray tracing problems at high latitudes; and (9) Study certain spacecraft-environment interaction problems, including those related to high-voltage power sources, spacecraft outgassing, artificial plasma cloud expansion, and spacecraft charging at LEO altitudes

DESCRIPTORS: (U) *GEOPHYSICS. *IONOSPHERE.

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*PLASMAS (PHYSICS), *SPACECRAFT CHARGING, *SOLAR ACTIVITY, CIRCULATION, DENSITY, ELECTRODYNAMICS, HIGH LATITUDES, INTERACTIONS, IONOSPHERIC MODELS, MAGNETOSPHERE, MODELS, RADAR, SPACECRAFT, TEMPERATURE, THERMOSPHERE, VELOCITY, INSTABILITY, OVER THE HORIZON RADAR, OUTGASSING, ATMOSPHERIC MOTION.

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) X-Ray Absorption Spectroscopy of Electrochemically Generated Species,

FEB 83 22P

IDENTIFIERS: (U) Modelling, Analysis, Instabilities, PE81103D, WJAFOSR3484HS.

PERSONAL AUTHORS: Heineman, William R.; Elder, Richard C.

CONTRACT NO. AFOSR-88-0089

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0209, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) X-ray absorption fine structure (EXAFS) spectroscopy has been combined with electrochemistry to enable the measurement of coordination numbers, donor atom types and bond lengths of metal ions in multiple oxidation states which are generated electrochemically. We have demonstrated the applicability of this technique to study the redox coordination chemistry of metal ions in aqueous and nonaqueous solvents, ionically conducting polymer films, electroactive films on conducting metals and electrically conducting polymers. Our objectives were to conduct research in the following areas: (1) electrostatic cross-linking of ionic polymer films and their effects on the structures of charged coordination compounds immobilized in the film, (2) cation charge transport and its effects on the structures of electroactive films such as Prussian blue deposited on electrodes, (3) metal ions incorporated in electrically conducting polymers, (4) development of a flow cell which enables EXAFS spectroelectrochemistry to be performed in a controlled atmosphere environment, (5) structure determination for metals and intermetallic compounds in mercury solvent, and (6) evaluation of spectroelectrochemical nernstian plots.

DESCRIPTORS: (U) *ABSORPTION, *ELECTROCHEMISTRY, *X RAYS, ADSORPTION, ATMOSPHERES, ATOMS, BLUE (COLOR), CATIONS, CELLS, CHEMISTRY, CONTROLLED ATMOSPHERES, ELECTRODES, ELECTROSTATICS, ENVIRONMENTS, FILMS, FLOW, INTERMETALLIC

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COMPOUNDS, IONS, MEASUREMENT, MERCURY, METALS, NUMBERS, OXIDATION, POLYMERS, SOLVENTS, SPECTROSCOPY, STRUCTURES, TRANSPORT, ELECTRON DONORS, CHEMICAL BONDS, OXIDATION REDUCTION REACTIONS, CONDUCTIVITY, ELECTRIC CHARGE, COPPER, NITROGEN, LIGANDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1, *Generated species, Coordination number, Aqueous, Nonaqueous, Spectro electrochemistry, Nernstian plots, EXAFS(X Ray Absorption Fine Structure), Nafion, Poly(Dimethyldiallylammonium Chloride), POMDAAC.

AD-A264 748 9/1

STANFORD UNIV CA

(U) Thermodynamic and Stochastic Theory of Electrical Circuits.

FEB 92 11P

PERSONAL AUTHORS: Hjelmfelt, Allen; Ross, John

CONTRACT NO. AFOSR-81-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0222, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Physical Review A, v45 n4 p2201-2210, 15 Feb 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We begin the development of a thermodynamic and stochastic theory of electrical circuits approaching nonequilibrium stationary states containing linear or nonlinear capacitors, resistors, and inductors. We restrict ourselves to circuits with only point attractors. The theory centers around a function ϕ , and we show that (1) it is the macroscopic driving force to a stationary state, (2) it is a global Liapunov function, (3) it provides necessary and sufficient conditions for the existence and stability of stationary states, (4) its time derivative is a component of the total dissipation, (5) it is an excess work of moving the circuit away from the stationary state, and (6) it determines a stationary probability distribution of a Fokker-Planck equation. The generalization from linear to nonlinear circuits is made with the concept of an instantaneous mapping from the nonlinear circuit to a thermodynamically and kinetically equivalent linear circuit. A translation of chemical to electrical networks holds at the thermodynamic but not stochastic level of description.

DESCRIPTORS: (U) *CIRCUITS, *ELECTRICAL NETWORKS, *THERMODYNAMICS, *ELECTRICAL PROPERTIES, AVAILABILITY.

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CAPACITORS, CHEMICALS, DISSIPATION, FOKKER PLANCK EQUATIONS, GLOBAL, INDUCTORS, MAPPING, PROBABILITY, REPRINTS, RESISTORS, STABILITY, STATIONARY, THEORY, TIME, TRANSLATIONS, WORK.

AD-A264 747 17/9 4/1 20/9

HAYSTACK OBSERVATORY WESTFORD MA

(U) Dual-mode E Region Plasmas Wave Observations from Millstone Hill.

IDENTIFIERS: (U) PE81102F, WUAFOSR230381, *Electrical circuits.

APR 83 21P

PERSONAL AUTHORS: DEL POZO, C. F.; Foster, J. C.; St Maurice, J. P.

CONTRACT NO. AFOSR-88-0023

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XC
TR-83-0288, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Geophysical Research, V88 nA4 p6013-6032, 1 Apr 83. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The unique capabilities of the Massachusetts Institute of Technology Millstone Hill Radar facility allow for high- sensitivity, dual-mode pricing of the unstable auroral ionosphere. From almost simultaneous observations of the E and F regions, we have determined both the local electric field and the spectral properties of the plasma wave backscatter. We present observations and analysis of the unstable auroral E region during local afternoon to early morning hours (respectively, the eastward and the westward electrojet conditions) and identify modified two- stream (Farley-Buneman) waves as well as two kinds of waves associated with the turbulence created by such waves. One of these types has properties similar to those of type 11 waves reported in the literature, whereas the second type has a broader spectrum, is detected in all directions, and appears to be new. From our observations, onset of turbulence corresponds to an electric field threshold of the order of 20 mV/m. We have detected the presence of an azimuthal asymmetry in both the threshold field and the observed phase velocities with systematically greater values which we attribute to the presence of a 50 m/s E-W neutral wind at E region heights. The maximum observed

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volume reflectivity for type I waves ranges exceeded 10-11 m-1 (80 dB above the stable thermal fluctuations) and that of the secondaries was of the order of 20 dB smaller.

DESCRIPTORS: (U) *ELECTROJETS, *IONOSPHERE, *PLASMA WAVES, *RADAR, DUAL MODE, E REGION, ELECTRIC FIELDS, HIGH SENSITIVITY, REFLECTIVITY, REPRINTS, SENSITIVITY, TURBULENCE, VELOCITY, AURORAE, BACKSCATTERING, ELECTRON DENSITY, MAGNETOSPHERE, SOLAR WIND, F REGION.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310A2..

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY
(U) A Mechanism For Timing Conditioned Responses.

92 11P

PERSONAL AUTHORS: Moore, John W.

CONTRACT NO. F49620-92-J-0387

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0279, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Time, Action and Cognition, p228-238 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Classical conditioning procedures instill knowledge about the temporal relationships between conditioned stimuli, which are regarded as predictive signals and triggers for action, and the unconditioned stimulus, the event to be timed. This knowledge is expressed in the temporal features of the conditioned response, which typically develop such that its peak amplitude occurs at times when the unconditioned stimulus is expected. A simple connectionist network, comprised of two neuron-like processing units, provides a mechanism that can account for virtually all aspects of conditioned response timing. The unfolding of time from the onsets and offsets of events such as conditioned stimuli as represented by the propagation of activity along delay lines. Input to the two processing units from conditioned stimuli arise from collateral taps off of each sequential element of these delay lines.

DESCRIPTORS: (U) *COGNITION, *CONDITIONED RESPONSE, AMPLITUDE, AVAILABILITY, DELAY LINES, INPUT, NERVE CELLS, NETWORKS, PROCESSING, REPRINTS, RESPONSE, SHIPS, SIGNALS, STIMULI, TAPS, TIME.

IDENTIFIERS: (U) PEB1102F, AFOSR23128S

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A264 745 CONTINUED

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Knowledge Structures in Temporally Adaptive
Conditioned Responding.

DESCRIPTORS: (U) *COGNITION, *SEMANTICS, *CONDITIONED
RESPONSE, AVAILABILITY, BEHAVIOR, CIRCUITS, DYSFUNCTION,
MEMBRANES, MODELS, RABBITS, REPRINTS, RESPONSE,
STRUCTURES, TOOLS, STIMULI, NEUROPHYSIOLOGY.

92 11P

IDENTIFIERS: (U) PE61102F, WUAFOSR2312BS.

PERSONAL AUTHORS: Moore, John W.

CONTRACT NO. F49820-92-J-0387

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0278, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Neuropsychology of Memory, p 510-
518 1992. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) One of the outstanding problems of
cognitive science is that of understanding how experience
assigns meaning to events. How does one set of stimulus
attributes become symbolic of another set of stimulus
attributes? This is the question of semantics.
Neuropsychologists are interested in this question
because of its implications for a wide variety of
cognitive and performance dysfunction. Classical
conditioning provides a set of tools for investigating
at both the behavioral and neurophysiological levels, how
semantic relations among events are established and how
these relationships determine behavior. Classical
conditioning provides a set of coherent theories,
typically mathematical models, which are capable of
detailed descriptions of phenomenology. Recently, there
has been progress in determining how these models might
be aligned with specific neural circuits and processes.
This chapter considers the kinds of knowledge instilled
by classical conditioning procedures and the ways in
which this knowledge is expressed in behavior. My
approach is both experimental and theoretical. Its focus
is the classically conditioned eyeblink/nictitating
membrane response of the rabbit.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 744 CONTINUED

OREGON STATE UNIV NEWPORT HATFIELD MARINE SCIENCE CENTER

(U) Complex Dynamics of a Catalytic Network Having Faulty Replication Into Error-Species,

93 23P

PERSONAL AUTHORS: Andrade, Miguel A.; Nuno, Juan C.; Moran, Federico; Montero, Francisco; Mpitso, George J.

CONTRACT NO. F48620-92-J-0140

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0277, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physica D, v83 p 21-40 1993.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We examine the dynamics of catalytic networks when error is introduced through faulty self-replication into a mutant molecular species. The model consists of n species that individually self-replicate through noncatalytic and catalytic action, and catalyze the replication of other species. Faulty replication produces error mutants which are assumed to be kinetically indistinguishable from one another. This aggregate error-species (error-tail) undergoes noncatalyzed self-replication, but has no effect on the catalytic species. A constant-population criterion produces competition among all reactants. The time evolution of the catalytic species can be expressed by a set of ordinary differential equations. We provide a detailed parametric analysis of the dynamics in a computationally tractable reduced model. Kinetic constants $K(j)$, controlling the enzymatic reactions can be used as bifurcation parameters to generate a rich repertoire of periodic and complex chaotic dynamics. Except for changes in the parametric position of bifurcation points, system dynamics is stable in response to changes in the quality of replication Q , where $1/Q$ is the mutation rate, and in the amplification constant A for the catalytic species. At low values of Q , the system

falls out of chaotic regimes and into a 'random-replication' state at which there are no catalytic species present. There is a similar insensitivity to changes in the amplification factor for the error species. A sub e , except for A sub e , = 0, at which the chaotic regimes remain stable throughout the full range of Q . We discuss the behavior of our model against one in which error is handled by means of mutual intermutation between the catalytic species.

DESCRIPTORS: (U) *MUTATIONS, *ENZYME CHEMISTRY, *NEURAL NETS, CHAOS, DIFFERENTIAL EQUATIONS, DYNAMICS, ERRORS, KINETICS, MODELS, PARAMETRIC ANALYSIS, QUALITY, TRACTABLE, CHEMICAL REACTIONS, REACTION KINETICS, ARTIFICIAL INTELLIGENCE.

IDENTIFIERS: (U) Catalytic networks, Limit cycles, Bifurcation, PE81102F, WUAFOSR2312A1.

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AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

YALE UNIV NEW HAVEN CT DEPT OF MATHEMATICS

(U) Research Proposal Quarterly Status Report for January-March 1993.

(U) Analysis and Computation for Vortex Dynamics and Rarefied Gases.

DESCRIPTIVE NOTE: Quarterly status rept. Jan-Mar 93.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

APR 93 92P

DEC 92 3P

MONITOR: AFOSR, XC
TR-93-0340, AFOSR

PERSONAL AUTHORS: Caflisch, Russel

CONTRACT NO. AFOSR-90-0013

UNCLASSIFIED REPORT

PROJECT NO. 2304

ABSTRACT: (U) The Research Proposal Quarterly Status Report is published in March, June, September, and December by the Air Force Office of Scientific Research (AFOSR). It lists all the research proposals received by AFOSR in the previous six months along with the action taken (Initiated, Declined or Withdrawn) on each report. The report is divided into two parts. The Institution Index lists proposals alphabetically by institution. This is followed by a more detailed listing by Directorate, and by Program Manager within the Directorate. This report is designed to inform other Government sponsoring agencies of the proposals received by the AFOSR and the action taken on these proposals. Readers must keep in mind that declined proposals should not necessarily be special programmatic emphasis.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *RESEARCH MANAGEMENT, INDEXES, REPORTS, CONTRACTORS.

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0324, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The researchers have developed a variety of adapted orthogonal transforms for signal compression and analysis. These methods have been used successfully in sound and high resolution image compression and are currently being tested for their technological value. In parallel, the best basis algorithm has been used by K. Sreenivasan for analysis of experimental turbulence data, and by M. Farge and V. Wickerhauser for the analysis of simulated two dimensional vorticity fields. This analysis permits a more careful comparison between simulation and experiment by detecting subtle differences in structures. By extracting coherent structures in the flows it promises to permit efficient tracking of these structures. In particular, as a result of testing by the FBI and Scotland Yard, a variant of these algorithms has been chosen for as a standard for fingerprint image compression with an estimated initial saving to the FBI in storage hardware alone of \$25,000,000. These methods are also being tested, in collaboration with Martin Marietta, for automatic target recognition.

DESCRIPTORS: (U) *RAREFIED GASES, *VORTICES, ALGORITHMS, AUTOMATIC, COMPRESSION, FINGERPRINTS, ORTHOGONALITY, COMPUTATIONS, DATA COMPRESSION, HIGH RESOLUTION, IMAGES, RESOLUTION, SAVINGS, SCOTLAND, SIGNALS, SIMULATION, SOUND, STANDARDS, STORAGE, TARGET RECOGNITION, TARGETS, TRACKING,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A284 705 CONTINUED

TURE-LENCE, TWO DIMENSIONAL.

IDENTIFIERS: (U) Orthogonal transforms.

AD-A284 892 6/4

TEXAS UNIV AT SAN ANTONIO NONLINEAR SIGNAL PROCESSING LAB

(U) Analysis of Visual Loss From Retinal Lesions.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Oct 92.

OCT 92 5P

PERSONAL AUTHORS: Longbootham, Harold

CONTRACT NO. AFOSR-89-0490

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0270, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress was made during the course of the Grant on the application of Order Statistics and Neural Network modeling to analysis of the onset of retinal lesions. Several medical applications of WMMR filters were initiated, leading to a number of publications and conference presentations by the PI and his co-workers.

DESCRIPTORS: (U) *LESIONS, *RETINA, NONLINEAR SYSTEMS, PATTERNS, LOSSES, SAMPLING, SIGNALS, VISION, CLASSIFICATION, ERROR CORRECTION CODES, FILTERS.

IDENTIFIERS: (U) WJAFOSR2304A5, *Neurophysiology, *Visual Loss.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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NORTH CAROLINA UNIV AT CHAPEL HILL DIV OF OTOLARYNGOLOGY

Level Difference), CMR(Comodulation Masking Release), Spectro temporal.

(U) Auditory Spectro-Temporal Pattern Analysis.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-31 Dec 92.

MAR 93 11P

PERSONAL AUTHORS: Hall, Joseph W.

CONTRACT NO. AFOSR-90-0108

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0252, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The long-term aim of this project was a better understanding of auditory processes which use across-frequency or across-ear temporal envelope and modulation differences cues to aid performance. Areas of investigation included comodulation masking release (CMR), the masking-level difference (MLD), temporal resolution, and the processing of amplitude and frequency modulation. The goals of the proposed experiments were to (1) examine the possible relation between CMR and auditory phenomena related to auditory grouping, or auditory scene analysis; (2) examine how CMR and MLD effects combine, and to examine the possible relation between CMR and the MLD for narrowband noise maskers; (3) to determine the extent to which across-frequency correlation of temporal envelopes may influence gap detection for wideband stimuli; (4) determine whether masking release can be derived from cues based upon across frequency coherence of frequency modulation; (5) examine a modulation masking phenomenon related to frequency modulation. The tasks involved signal detection in masking noise, temporal gap detection, and the detection of frequency modulation.

DESCRIPTORS: (U) *AUDITORY ACUITY, *HEARING, PATTERNS, EAR, PERFORMANCE(HUMAN), CHOLINERGIC NERVES, SOUND, SOUND TRANSMISSION, SIGNAL PROCESSING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313AS, MLD(Masking

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Y4155F

AD-A264 685 CONTINUED

CLARKSON UNIV POTSDAM NY

(U) Colloid and Interface Chemistry Aspects of Ceramics.

DESCRIPTIVE NOTE: Final rept. 1989-1992.

APR 83 12P

PERSONAL AUTHORS: Matijevic, Egon

CONTRACT NO. AFOSR-89-0441

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0329, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major goal of this project was to address the properties and interactions of fine powders of interest in ceramics. In order to arrive at quantitative conclusions and assure reproducibility of data, the first requirement was to have well defined dispersions consisting of uniform particles of different chemical compositions (simple or mixed) and in different shapes. Thus, one part of the program has dealt with the synthesis of such 'monodispersed' powders. Specifically, we have produced colloidal particles of different metals, metal oxides, and silicon nitride. In addition, internally mixed particles of stoichiometrically defined metal ratios (such as metal niobates) and of variable composition have been obtained. Finally, coated particles of inorganic cores covered with shells of either different inorganic compounds or of polymers were prepared. All these systems were characterized in terms of their bulk and surface properties. In the other part of the program, we studied, theoretically and experimentally, interactions between unlike particles (i.e., the stability of mixed dispersions), in order to evaluate compaction and sintering effects of such powders. The rate of heterocoagulation was followed in aqueous dispersion of different combinations of particles and the obtained data were compared with expected values based on different theoretical models. The significant discrepancies between the experimentally evaluated and

calculated stability ratios could be reconciled, if the surface charge segregation was taken into account. Adhesion of particles, Ceramic powders, Coated particles, Colloid particles, Composite particles, Heterocoagulation, Monodispersed colloids, Powders.

DESCRIPTORS: (U) *COLLOIDS, *CERAMIC MATERIALS, ADHESION, CHEMICAL COMPOSITION, CORES, DEPOSITION, DISPERSIONS, INORGANIC COMPOUNDS, INTERACTIONS, LAYERS, METALS, MODELS, NIOBATES, NITRIDES, OXIDES, PARTICLES, POLYMERS, POWDERS, RATES, RATIOS, REPRODUCIBILITY, REQUIREMENTS, SHAPE, SILICON, SILICON NITRIDES, SINTERING, SOLIDS, STABILITY, STATIC ELECTRICITY, SURFACE PROPERTIES, SYNTHESIS, TRANSITIONS, VARIABLES, STOICHIOMETRY, COATINGS, BULK MATERIALS, COAGULATION, COMPOSITE MATERIALS, COPPER, NICKEL, COBALT, IRON, RUTHENIUM, PALLADIUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Interface chemistry, Compaction, Aqueous.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A284 884 CONTINUED

WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY

(U) The Reactions of Atomic Oxygen with Si(100) and Si(111)
: 2. Adsorption, Passive Oxidation and the Effect of
Coincident Ion Bombardment,

92 18P

PERSONAL AUTHORS: Engstrom, J. R.; Bonser, D. J.; Engel,

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC
TR-93-0332, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v288 p238-284 1992.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The reactions of atomic oxygen with the (100) and (111) surfaces of silicon have been investigated by employing supersonic molecular beam techniques. X-ray photoelectron spectroscopy (XPS), and low-energy ion scattering spectroscopy (ISS). Atomic oxygen adsorbs with unit probability on the clean silicon surface, independent of substrate temperature (110-800 K) and incident mean translational energy (3-18 kcal mol⁻¹). Oxidation of clean silicon with an oxygen atom beam is characterized by two stages: a 'fast' stage that corresponds to oxygen chemisorption in the topmost 2-3 silicon layers; and a 'slow' stage that corresponds to oxygen incorporation and oxide film growth. The chemisorption stage is described by first-order Langmuirian kinetics with an apparent saturation coverage of approximately 4 ML O(a), the oxide growth stage by 'direct' logarithmic kinetics, where $dx/dt = \alpha \exp(-x/L)$, where x is the oxide thickness. Observation of significant oxidation at substrate temperatures of 110 K suggests that oxide growth in the slow stage may occur by a field-assisted mechanism, where an internal electric field aids transport of oxygen to the underlying silicon substrate layers. (Author)

DESCRIPTORS: (U) *OXYGEN, *ATOMIC STRUCTURE, *SILICON,

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REPRINTS, ADSORPTION, OXIDATION, ION BOMBARDMENT, CHEMICAL REACTIONS, SURFACES, MOLECULAR BEAMS, SUPERSONIC FLOW, X RAY PHOTOELECTRON SPECTROSCOPY, LOW ENERGY, SCATTERING, ENERGY, CHEMISORPTION, LAYERS, THIN FILMS, KINETICS, SATURATION, OXIDES, THICKNESS, TEMPERATURE, ELECTRIC FIELDS, SUBSTRATES, NUCLEATION, ARGON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, Passive, Coincident, Fast stage, Slow stage, Langmuirian, Gas solid reactions, Translational energy.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 683 CONTINUED

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

AD-A264 683

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7/6

(U) Studies in Lewis Acid and Supracid Ionic Liquids.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Jun 92.

APR 93 33P

PERSONAL AUTHORS: Osteryoung, Robert A.

CONTRACT NO. AFOSR-90-0089

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XC
TR-83-0338, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies in an ambient temperature chloroaluminate molten salt composed of aluminum chloride and 1-ethyl-3-methylimidazolium chloride were carried out. A variety of topics were investigated. The behavior of electroactive polymers, mainly polyaniline, was investigated, and simultaneous EPR and electrochemical experiments were carried out. The stoichiometry of several inorganic complexes ions was investigated in a near neutral melt, and a procedure to buffer the neutral melts was examined. A number of electrochemical studies with emphasis on the use of fast pulse voltammetry at very small microelectrodes were carried out. Finally, the chemistry and electrochemistry of solutes as influenced by the presence of a proton (Bronsted) acid were investigated by means of electrochemical and NMR techniques. Gutmann donor/acceptor numbers of the melts were obtained, and the behavior of dimethylaniline in the presence and absence of a Bronsted acid was examined. The presence of both Lewis and Bronsted adducts was confirmed. ... Chloroaluminates, Ionic liquids, Molten salt, Electrochemistry, Nuclear magnetic resonance, Supracid.

DESCRIPTORS: (U) *IONS, *LIQUIDS, *MOLTEN SALTS, *ALUMINATES, *CHLORINE, ACIDS, ALUMINUM, BUFFERS, CHEMISTRY, CHLORIDES, ELECTROCHEMISTRY, MELTS, NEUTRAL, NUCLEAR MAGNETIC RESONANCE, POLYMERS, PULSES, SOLUTES, STOICHIOMETRY, TEMPERATURE, VOLTAMMETRY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 682 1/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

(U) Analytical Foundations of Gain Scheduling.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-28 Feb 93,

MAR 93 7P

PERSONAL AUTHORS: Rugh, Willson J.

CONTRACT NO. AFOSR-90-0138

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0325, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report briefly describes research results on a theory of gain scheduling for flight control applications that were obtained by the Principal Investigator and his students over the three-year period of support. Results reported include development of a basic theory of gain scheduling in nonlinear systems, solution of output regulation problems based on an exogenous system assumption for the exogenous signals (including disturbance and scheduling signals), initial development of methods to alleviate performance degradation in the case of rapidly-varying scheduling signals, and an exploratory application of these results to an autopilot design example. Publications describing the results in detail are listed.... Control Theory, Nonlinear Control Systems, Gain Scheduling.

DESCRIPTORS: (U) *AUTOMATIC PILOTS, *FLIGHT CONTROL SYSTEMS, CONTROL THEORY, DEGRADATION, FLIGHT, GAIN, NONLINEAR SYSTEMS, OUTPUT, SCHEDULING, SIGNALS, THEORY.

IDENTIFIERS: (U) WJAFOSR2304AS.

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AD-A264 681 6/4 7/4

DALHOUSIE UNIV HALIFAX (NOVA SCOTIA) DEPT OF PSYCHOLOGY
(U) Neurophysiological Analysis of Circadian Rhythm
Entrainment.

DESCRIPTIVE NOTE: Final rept. 1 Jan 90-31 Dec 92,

MAR 93 15P

PERSONAL AUTHORS: Rusak, Benjamin

CONTRACT NO. AFOSR-90-0104

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0335, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We review recent studies in our laboratory which have investigated the neural mechanisms underlying photic entrainment of the mammalian circadian system. The results from studies of extracellular single-unit recordings and of photic induction of Fos-like immunoreactivity (-lir) indicate that excitatory amino acid (EAA) transmission, and particularly, activation of the NMDA receptor subtype, is important for conveying photic information to suprachiasmatic nucleus (SCN) cells. We have also found that a sub-region of the SCN still shows Fos-lir after blockade of EAA receptors, and we have evidence suggesting that these cells are innervated by a distinct subdivision of the retinal projection to the SCN. In addition, we have found that photic responses of cells in the intergeniculate leaflet (which projects to the SCN) and of SCN cells are modulated by serotonin via a receptor that resembles the 5HT1A subtype.

DESCRIPTORS: (U) *ENTRAINMENT, *NERVE CELLS, *CIRCADIAN RHYTHMS, ACTIVATION, AMINO ACIDS, LABORATORIES, SEROTONIN, DOCUMENTS, GENES, LIGHT PULSES, NERVES, NEUROTRANSMITTERS, PEPTIDES, SENSITIVITY, RESPONSE(BIOLOGY).

IDENTIFIERS: (U) PE61102F, WJAFOSR2312CS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A264 678 5/2

CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

TENNESSEE UNIV KNOXVILLE

(U) Nonsmooth Optimization Algorithms, System Theory, and
Software Tools.

(U) Efficient Algorithms and Data Structures in Geometric
Design.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Dec 92.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 Mar 93,

APR 93 10P

MAR 93 4P

PERSONAL AUTHORS: Polak, ElIJah

PERSONAL AUTHORS: Bajaj, Chandrajit L.

CONTRACT NO. AFOSR-90-0068

CONTRACT NO. AFOSR-91-0276

MONITOR: AFOSR, XC

PROJECT NO. 2304

TR-93-0327, AFOSR

TASK NO. DS

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0328, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research described in this report
deals with the development of (1) efficient, consistent
discretization techniques for use in semi-infinite
optimization, optimal control algorithms that solve
problems with dynamics governed by partial differential
equations, (2) superlinearly converging semi-finite
optimization algorithms, (3) various techniques for
finding design parameters satisfying specifications, (4)
optimal control algorithms for discrete and distributed
systems with control, state and shape constraints, and (5)
efficient numerical procedures for the integrated design
of flexible structures and their control systems....
Optimization, Optimal shape design algorithms.

ABSTRACT: (U) Research has been conducted on the design
of a numerically stable and topologically robust
algorithm for boolean set operations between solids with
algorithms surface patches of arbitrary degree.

DESCRIPTORS: (U) *ALGORITHMS, *OPTIMIZATION, *SOFTWARE
ENGINEERING, CONTROL SYSTEMS, DYNAMICS, FLEXIBLE
STRUCTURES, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS,
SHAPE, SPECIFICATIONS, NONLINEAR PROGRAMMING, PROBLEM
SOLVING, TOOLS.

DESCRIPTORS: (U) *BOOLEAN ALGEBRA, *ALGORITHMS,
INFORMATION PROCESSING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304DS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 677 12/1 9/1

AD-A264 676 12/3 12/1

MINNESOTA UNIV MINNEAPOLIS INST FOR MATHEMATICS AND ITS APPLICATIONS

TENNESSEE UNIV KNOXVILLE

(U) Linear Algebra for Signal Processing.

(U) Statistical and Numerical Methods in Control and Identification.

DESCRIPTIVE NOTE: Final rept. 1 Feb 92-31 Jan 93,

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-31 Dec 92,

APR 93 20P

DEC 92 10P

PERSONAL AUTHORS: Friedman, Avner; Miller, Willard, Jr

PERSONAL AUTHORS: Fitzpatrick, Ben

CONTRACT NO. F49620-92-J-0149

CONTRACT NO. AFOSR-91-0021

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. ES

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0320, AFOSRMONITOR: AFOSR, XC
TR-93-0326, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant supported research in Applied Linear Algebra for Signal Processing, part of the IMA 1991-92 program in Applied Linear Algebra. Specifically the grant supported 12 one-month visitors-during the April-May 1992 period devoted to signal processing and also provided support for the workshop Linear Algebra for Signal Processing (April 8-10, 1992) organized by Adam Bojanczyk and George Cybenko, including some funds for publication costs of the proceedings as an IMA Volume.

DESCRIPTORS: (U) *LINEAR ALGEBRA, *SIGNAL PROCESSING, *APPLIED MATHEMATICS, ALGEBRA, COSTS, GRANTS, SIGNALS, WORKSHOPS, ALGORITHMS, RESEARCH MANAGEMENT.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304ES.

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ABSTRACT: (U) We report on several research projects funded by grant AFOSR-91-0021. Substantial progress has been made in statistical areas, especially in Bayesian analysis and empirical distributions, and in analysis of inverse problems in structures and groundwater modeling. Our numerical studies have focused on parallel statistical computing in inverse problems, identification in conservation laws, cooling of viscoelastic films, and a general problem involving the estimation of measures. We have computing facilities and the structures lab of Phillips Lab, in order to tailor the statistical and numerical techniques under study to those problems of interest to AFOSR. We have also visited AFESC at Tyndall AFB to discuss mathematical issues in groundwater modeling problems of interest to the Air Force.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *NUMERICAL METHODS AND PROCEDURES, AIR, AIR FORCE, CONSERVATION, COOLING, DISTRIBUTION, FACILITIES, FILMS, GRANTS, IDENTIFICATION, OILS, STRUCTURES, APPROXIMATION(MATHEMATICS), WATER POLLUTION, TRUSSES, CERAMIC MATERIALS, PIEZOELECTRIC MATERIALS, CONTROL, AIR FORCE RESEARCH, BAYES THEOREM, PROBLEM SOLVING, STATISTICAL DISTRIBUTIONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304AS.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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PITTSBURGH UNIV PA DEPT OF PSYCHIATRY

(U) Organization of the Human Circadian System.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-31 Jan 93.

JAN 93 10P

PERSONAL AUTHORS: Moore, Robert Y.

CONTRACT NO. AFOSR-91-0175

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-83-0336, AFOSR

IDENTIFIERS: (U) PE81102F, WUAFOSR2312CS.

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, BOUNDARIES, CATS, CONTRAST, DISTRIBUTION, FETUS, FIBERS, HUMANS, HYPOTHALAMUS, MAMMALS, MATERIALS, MONKEYS, MORPHOLOGY, NERVE CELLS, PEPTIDES, POPULATION, QUANTITATIVE ANALYSIS, ACTUATORS, BODIES, COSTS, BUDGETS, ROBOTICS, COMPUTERS, NERVE CELLS.

UNCLASSIFIED REPORT

ABSTRACT: (U) In brains obtained from late gestation fetuses (33-38 weeks), newborns and young individuals to approximately age 50, the SCN is virtually always identifiable as a discrete nucleus with clear boundaries. From age 50-90, it is sometimes evident and sometimes not evident in the material. We have completed analysis of 22 hypothalami prepared for immunocytochemistry, including quantitative analysis. Sections are routinely stained for VIP, VP, NPY and NT. This analysis has revealed several interesting aspects of the human SCN. First, in contrast to what is found in Nissl material, the SCN is always evident as a distinct nucleus in immunocytochemical material. Second, it appears as the first component of the hypothalamus to be found in a rostrocaudal set of coronal sections. Third, the human SCN is characterized by four separate populations of neurons that have different peptide content. These neuronal populations have a different distribution in the nucleus. In contrast to all other mammals, the human SCN contains a population of NPY + neurons that overlaps the VIP + group but extends dorsally beyond it in the center on the SCN. Among the NPY + neurons are scattered coarse fibers and varicosities and a fairly dense plexus of very fine fibers and small varicosities. These are very similar in morphology to GHT projections in other mammals, particularly the cat and monkey.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I55F

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AD-A264 674 CONTINUED

PENNSYLVANIA UNIV PHILADELPHIA

EVALUATION, TRANSFORMATIONS, WORK.

(U) The Dynamics of Visual Representation, Attention, Encoding, and Retrieval Processes.

IDENTIFIERS: (U) WUAFOSR2313BS.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-30 Oct 92.

APR 93 12P

PERSONAL AUTHORS: Sternberg, Saul

REPORT NO. AFOSR-91-0015

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0339, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the Final Technical Report of work supported by a grant entitled The dynamics of visual representation: Attention, encoding, and retrieval processes. After a section describing the objectives of the work, the report provides a synopsis of the principal accomplishments, in five categories: (1) Investigation of the relation between location-probe and probed-reciting paradigms, to test whether the transformations that underlie performance changes with probe delay in the two paradigms are the same or different; (2) Investigation of the transformation associated with the location-probe paradigm; (3) Extensive work with the probed-reciting paradigm at zero probe delay, manipulating the legibility of the displayed characters as another approach to studying the transformation required for response; (4) Application of variants of a traditional visual search paradigm to investigate effects of properties of the early representation on the order of search, again by manipulating legibility; (5) Development of new tests of stage models of mental operations. Psychology, Information-processing, Visual, Memory, Reaction-time

DESCRIPTORS: (U) *INFORMATION PROCESSING, *REACTION TIME, *MEMORY(PSYCHOLOGY), *VISUAL PERCEPTION, ATTENTION, CODING, DELAY, DYNAMICS, GRANTS, LEGIBILITY, MODELS, OPERATION, PROBES, PSYCHOLOGY, RESPONSE, TEST AND

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I55F

AD-A284 671 20/8 7/6 7/3 7/4 AD-A284 671 CONTINUED

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

TEMPERATURE, WATER.

(U) Phosphorescence Investigation of the Conformation of a
Bromonaphthalene-Labeled Poly(acrylic acid),
IDENTIFIERS: (U) PE81102F, *Conformation, Pendant,
Bromonaphthalene.

9E 7P

PERSONAL AUTHORS: Turro, Nicholas J.; Kim, Jin-Baek;
Caminati, Gabriella

CONTRACT NO. AFOSR-89-215

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0331, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Macromolecules, v28 p1930-1935 1993.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A copolymer of 4-bromo-1-naphthyl vinyl
ketone and acrylic acid (BNPAA) has been prepared by free
radical polymerization. The pendant bromonaphthalene (BN)
group endow the polymer with the unusual property of
readily observable phosphorescence in solution at room
temperature. The phosphorescence of BNPAA was
investigated systematically in solution at room
temperature as a function of polymer concentration, salt
concentration, solvent structure, and other variables and
shows that phosphorescence can serve as a probe of
polymer conformation. Employing the phosphorescence
lifetime criterion as a probe, the conformation of BNPAA
was studied under a variety of conditions. The effect of
different solvents on the polymer conformation was
investigated and the strength of solvent-polymer
interactions was found to decrease in the order water >
methanol > dioxane. Phosphorescence, Polymers,
Bromonaphthalene-labeled Poly(acrylic acid)

DESCRIPTORS: (U) *BROMINE, *NAPHTHALENES, ACIDS, ACRYLIC
ACID, COPOLYMERS, DIOXANES, FREE RADICALS, FUNCTIONS,
INTERACTIONS, KETONES, METHANOLS, VINYL RADICALS,
REPRINTS, PHOSPHORESCENCE, POLYMERIZATION, POLYMERS,
PROBES, ROOM TEMPERATURE, SALTS, SOLVENTS, STRUCTURES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 668 8/1 6/4

AD-A264 847 7/4 20/8 20/2 20/11

SAN FRANCISCO STATE UNIV TIBURON CA ROMBERG TIBURON CENTERS

INTERNATIONAL BUSINESS MACHINES CORP SAN JOSE CA

(U) Inhibition of DNA Binding by the Phosphorylation of Poly ADP-Ribose Polymerase Protein Catalyzed by Protein Kinase C.

(U) Fundamental Studies of Friction, Lubrication, and Wear by Atomic Force Microscopy.

DESCRIPTIVE NOTE: Final rept.,

DESCRIPTIVE NOTE: Annual rept. 1 Apr 92-31 Mar 93,

APR 93 40P

APR 93 50P

PERSONAL AUTHORS: Kun, Ernest

PERSONAL AUTHORS: McClelland, Gary M.

CONTRACT NO. F49620-92-J-0232

CONTRACT NO. F49620-89-C-0068

PROJECT NO. 2312

MONITOR: AFOSR, XC
TR-93-0333, AFOSR

TASK NO. AS

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0319, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Purified type II (beta) and type III (alpha) protein kinase C phosphorylates highly purified polyADP-ribose polymerase in vitro whereby 2 mols of phosphate are transferred from ATP to serine and threonine.

DESCRIPTORS: (U) *DEOXYRIBONUCLEIC ACIDS, *ENZYME INHIBITORS, ADENOSINE PHOSPHATES, CELLS(BIOLOGY), PHOSPHATES, PHOSPHORUS TRANSFERASES, PHOSPHORYLATION, PROTEINS, RESIDUES, RIBOSE, SERINE, THYMUS, CATALYSIS, IN VITRO ANALYSIS, IN VIVO ANALYSIS.

IDENTIFIERS: (U) PE81102F. PolyADPribose, Polymerase, Protein kinase C, Cellular signal transduction, Chemical binding, Threonine

AD-A264 668

UNCLASSIFIED

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ABSTRACT: (U) To probe friction, lubrication, and wear on an atomic scale, a capacitance-based ultrahigh vacuum force microscope was developed. It measures both parallel and perpendicular forces between a tip and a surface. Friction between a diamond tip and chemical-vapor-deposited (CVD) diamond films at loads below one micronewton showed a sublinear dependence of friction on load, with the effective friction coefficient varying between 0.2 and 0.8 depending on load and location. Stick-slip behavior resulting from both surface heterogeneity and static/dynamic friction was observed. A CVD process was developed for growing single crystal diamond tips with radii as small as 30 nm. The normal force between these tips and diamond (100) and (111) surfaces agrees with calculated dispersion forces. The frictional force variation on the (100) surface are tentatively associated with a reconstructed geometry convoluted over an asymmetric tip shape, while the (111) surface exhibits features which cannot be simply associated with the surface structure. Friction is approximately 3 nanonewtons independent of loads up to 100 nanonewtons. A field emission technique was developed for continuously observing the motion of individual adsorbed atoms and molecules. The hopping of individual Cs atoms between sites on a tungsten tip was observed with 2 ps and 5 Angstrom resolution.

DESCRIPTORS: (U) *FRICTION, *LUBRICATION, *MICROSCOPES, *WEAR, ATOMS, CAPACITANCE, COEFFICIENTS, DIAMONDS, DISPERSIONS, DYNAMICS, FIELD EMISSION, FILMS, GEOMETRY,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 647 CONTINUED

AD-A264 643 9/5

HETEROGENEITY, MOLECULES, MOTION, PROBES, RESOLUTION, SCALE, SHAPE, SINGLE CRYSTALS, SITES, STATICS, STRUCTURES, TUNGSTEN, ULTRAHIGH VACUUM, VARIATIONS, PARALLEL ORIENTATION, VAPOR DEPOSITION, CHEMICAL REACTIONS, LOADS(FORCES), ADSORPTION, CESIUM, SURFACE ANALYSIS.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS INC
PISCATAWAY NJ

(U) Topical Meeting of Broadband Analog and Digital
Optoelectronics.

IDENTIFIERS: (U) Atomic force microscopy, Perpendicular,
Tips, Hopping.

DESCRIPTIVE NOTE: Final rept. 1 May-31 Dec 92,

92 328P

PERSONAL AUTHORS: Mangemann, Robert

CONTRACT NO. F49620-92-J-0199

PROJECT NO. 2863

TASK NO. HS

MONITOR: AFOSR, XC
TR-93-0318, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial Contents: Analog Systems;
Multichannel Video Distribution; Digital Video and
Compression Techniques; Digital Transmission Technology;
Linearization and Harmonic Distortion.

DESCRIPTORS: (U) *ELECTROOPTICS, *ANALOG SYSTEMS,
*DIGITAL SYSTEMS, BROADBAND, FIBER OPTICS, DATA LINKS,
VIDEO SIGNALS, MULTICHANNEL COMMUNICATIONS, CABLE
TELEVISION, COMPRESSION, SIGNAL PROCESSING, TRANSMITTING,
ANTENNAS, LINEAR SYSTEMS, HARMONICS, DISTORTION,
TRANSMISSION LINES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A264 640 12/1 20/4

AD-A264 635 9/5 9/3 14/2

INSTITUTE FOR ADVANCED STUDY PRINCETON NJ DEPT OF MATHEMATICS

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Localization and Transport in Random Media.

(U) Subpicosecond Electrooptic Sampling.

DESCRIPTIVE NOTE: Final rept. 1 Oct 91-30 Sep 92,

DESCRIPTIVE NOTE: Interim rept. 1 Feb 92-31 Jan 93.

FEB 93 6P

JAN 93 131P

PERSONAL AUTHORS: Spencer, Thomas

PERSONAL AUTHORS: Bloom, David M.

CONTRACT NO. F49620-92-J-0023

CONTRACT NO. F49620-92-J-0099

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. CS

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0321, AFOSR

MONITOR: AFOSR, XC
TR-93-0253, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During the 1991-1992 academic year the Institute for Advanced Study conducted a Program in applied mathematics with special emphasis on computational fluid dynamics. This was the first time since the days of von Neumann that the Institute has had a major presence in applied mathematics. The senior mathematicians who formed the core of this Program were A Chorin, B Engquist, A Majda, G Papanicolaou and V Rokhlin. There were a total of about fifteen members participating in the Program. AFOSR helped make this ambitious program possible by providing partial support for George Papanicolaou and Michael Shelly. They were both major participants in the Program and interacted intensively with their colleagues.

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *COMPUTATIONAL FLUID DYNAMICS, CORES, FLUID DYNAMICS, FLUIDS, MATHEMATICS, CONVECTION, DIFFUSION, MEDIA.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304CS.

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ABSTRACT: (U) The electro-optic sampling system developed under AFOSR contract no. F49620-85-0016 has been the workhorse for high speed measurements made in this lab. This report documents the continuing effort to improve this tool and highlights its most recent uses. In addition, we report the development of a time-lens, a new tool that gives us electronic control of the shape of optical pulses. The development of a time-lens has opened up a new field of research. It is a tool to electronically control the temporal characteristics of optical pulses just like glass lenses control the spatial characteristics. Our results to date include the creation of 7 ps pulses from a CW laser, active focusing (compression) of 55 ps pulses down to 2 ps, and demonstration of the time-reversal properties of time-lenses. A Ph.D. thesis detailing the Stanford time-lens and pulse compression experiments is included as an appendix. Electro-optic sampling, Time-lens, Erbium doped fiber amplifier.

DESCRIPTORS: (U) *LENSES, *ELECTROOPTICS, *LASER APPLICATIONS, *TEST EQUIPMENT, ADDITION, AMPLIFIERS, COMPRESSION, CONTROL, DEMONSTRATIONS, ELECTRONICS, ERBIUM, FIBERS, FOCUSING, GLASS, LASERS, MEASUREMENT, OPTICS, PULSE COMPRESSION, PULSES, SAMPLING, SHAPE, THESES, TIME, TOOLS, VELOCITY, LIGHT PULSES, CONTINUOUS WAVE LASERS, PULSED LASERS, RECEIVERS, FIBER OPTICS, CIRCUITS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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DIELECTRIC PROPERTIES, RESONATORS, LIGHT MODULATORS, MODE
LOCKED LASERS.

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Workshop on the Road to Room Temperature
Superconductivity.

IDENTIFIERS: (U) WJAFOSR2301AS, *Time lenses, Optical
pulses, *Electrooptic sampling.

DESCRIPTIVE NOTE: Final rept. 15 Oct 92-14 Jan 93,

JAN 93 8P

PERSONAL AUTHORS: Geballe, Theodore H.

CONTRACT NO. F49620-93-1-0038

PROJECT NO. 0440

TASK NO. 31

MONITOR: AFOSR, XC
TR-93-0257, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) History shows right from the beginning that there has been no successful prediction of new families of superconductors. Discoveries in this field have been unexpected, even revolutionary, and not foreseen as simple and logical next steps in an ongoing scientific enterprise. The Bednorz-Muller discovery of superconductivity in the copper-oxide perovskite family was just such a revolutionary jump. But evolutionary research aimed at the synthesis and characterization of new compositions can also give insightful and even unexpected results. To this end, a 2-day workshop was recently held in which a diverse group of researchers discussed the possibility of reaching substantially higher transition temperatures than are presently known.

DESCRIPTORS: (U) *HIGH TEMPERATURE SUPERCONDUCTORS,
*SUPERCONDUCTIVITY, *SYNTHESIS(CHEMISTRY), SYMPOSIA,
TRANSITION TEMPERATURE, COPPER COMPOUNDS.

IDENTIFIERS: (U) WJAFOSR044031, Copper oxide.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

AD-A264 623 15/4 17/11 12/3
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL
ENGINEERING

(U) Multiscale and Multigrid Information Representation,
Extraction and Fusion.

DESCRIPTIVE NOTE: Final rept. 1 Feb 92-31 Jan 93,

APR 93 71P
PERSONAL AUTHORS: Tewfik, Ahmed

CONTRACT NO. F49620-92-J-0134

PROJECT NO. 2304

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0322, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic goal of this research was to study the role that wavelet theory can play in information representation and extraction. The researchers focused their attention primarily on surveillance applications. As part of their research, they studied two problems that arise in surveillance. The first problem was that of determining the directions of arrivals of a set of plane waves in the presence of a background noise of unknown correlation structure. The second problem involved selecting an optimal set of N waveforms, with N fixed, to obtain the best reconstruction of a distributed range-doppler target reflectivity function.

DESCRIPTORS: (U) *PLANE WAVES, *SURVEILLANCE, *WAVEFORMS, *DIRECTION FINDING, *TARGET DETECTION, ATTENTION, BACKGROUND, BACKGROUND NOISE, CORRELATION, EXTRACTION, FUNCTIONS, NOISE, RECREATION, REFLECTIVITY, STRUCTURES, TARGETS, THEORY, DOPPLER SYSTEMS, SIGNAL PROCESSING, TRANSFORMATIONS(MATHEMATICS), MATHEMATICAL ANALYSIS, INFORMATION THEORY.

IDENTIFIERS: (U) WUAFOSR2304ES, PEB1102F, Wavelet transforms, Wavelet theory.

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AD-A264 570 9/1 11/2 20/2 7/4

WESTINGHOUSE SCIENCE AND TECHNOLOGY CENTER PITTSBURGH PA
(U) Improved Gallium Nitride and Aluminum Nitride
Electronic Materials.

DESCRIPTIVE NOTE: Annual rept. 20 Feb 92-18 Feb 93,

MAR 93 43P

PERSONAL AUTHORS: Partlow, W. D.; Choyke, W. J.; Devaty,
R. P.; Yates, John T., Jr.; Bornschauer, Karl-Heinz

REPORT NO. 93-9SB2-ALGAN-R1

CONTRACT NO. F49620-91-C-0032

PROJECT NO. 2305

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0347, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress in the second year of a three year program to improve the quality of gallium and aluminum nitride electronic materials. In this period we completed surface chemistry equipment modifications and characterization, and began experiments to control and understand the surface reactions associated with the growth of gallium nitride. By subjecting a physisorbed monolayer of trimethyl gallium (TMG) to a cool beam of atomic hydrogen atoms, we successfully converted it to metallic Ga, which is much more reactive with nitriding species, and will result in a more stoichiometric and higher purity gallium nitride. In the materials characterization effort of the program, infrared reflectance spectral and cathodoluminescence spectra were measured for epitaxial AlN films. The reflectance spectra were compared to a Lorentz oscillator model which make it possible to separate out the contribution of the AlN even when the bands of the film and substrate overlapped.

DESCRIPTORS: (U) *ELECTRONICS, *MATERIALS, *GALLIUM, *NITRIDES, *ALUMINUM, SURFACE CHEMISTRY, LAYERS, ATOMIC PROPERTIES, HYDROGEN, METALS, PURITY, INFRARED SPECTRA,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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REFLECTANCE, CATHODOLUMINESCENCE, EPITAXIAL GROWTH, FILMS, OSCILLATORS, MODELS, SUBSTRATES, LORENTZ FORCE, ADSORPTION, ORGANOMETALLIC COMPOUNDS, COMPOSITE MATERIALS.

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF BIOLOGY
(U) Control and Circadian Behavior by Transplanted Suprachiasmatic Nuclei.

IDENTIFIERS: (U) WUAFOSR2305ES, Physisorbed monolayer, Trimethyl gallium, Bands.

DESCRIPTIVE NOTE: Final rept. 15 Nov 89-14 Nov 92.

NOV 92 10P

PERSONAL AUTHORS: Menaker, Michael

CONTRACT NO. AFOSR-90-0098

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0337, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Fetal SCN tissue transplanted into the third ventricle of hamsters bearing complete SCN lesions restores the circadian locomotor rhythm with a period that depends exclusively on the genetically determined period of the tissue donor. If the host is only partially lesioned and thus retains rhythmicity with its own genetically determined period, an implant from an animal of a different genotype can induce a second rhythm with a period determined by the donor genotype. Both rhythms can be present simultaneously in the record of such a temporal chimera, interacting only superficially (i.e., not at the level of the pacemaker). Our data support the interpretation that under such circumstances the graft is able to capture part of the locomotor output of the circadian system but does not make functional connections with the host SCN pacemaking system.

DESCRIPTORS: (U) *GENETICS, *MUTATIONS, *CIRCADIAN RHYTHMS, HAMSTERS, LESIONS, OUTPUT, PACEMAKERS, SURGICAL TRANSPLANTATION, VENTRICLES, BOUNDARIES, FUNCTIONS, OSCILLATORS, OUTPUT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312CS, *Circadian behavior, *Suprachiasmatic nuclei, Homozygous mutants

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AD-A264 438 6/1 6/15

DREXEL UNIV PHILADELPHIA PA ENVIRONMENTAL STUDIES INST

SCRIPPS RESEARCH INST LA JOLLA CA

(U) Development of Novel Models for Describing Multiple Toxicity Effects.

(U) Molecular Approach to Hypothalamic Rhythms.

DESCRIPTIVE NOTE: Annual rept. 20 Sep 91-19 Sep 93,

DESCRIPTIVE NOTE: Annual rept. 15 Mar 92-14 Mar 93,

SEP 92 3P

MAR 93 25P

PERSONAL AUTHORS: Haas, Charles N.

PERSONAL AUTHORS: Sutcliffe, J. G.

CONTRACT NO. AFOSR-91-0428

CONTRACT NO. F49620-92-J-0188

PROJECT NO. 2312

PROJECT NO. 2312

TASK NO. A4

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0242, AFOSRMONITOR: AFOSR, XC
TR-93-0280, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The project was initiated October 1, 1991. Major accomplishments during the first year of the project were: (1) refinement of data analysis software; (2) conduct of a literature review of binary and multicomponent toxic response data; (3) analysis of a sample of data sets using the developed software; and (4) refinement of the theory of copulas with respect to multicomponent dose-response relationships. Papers relating to the work have been submitted and/or presented in the following locations: International Association on Water Pollution Research and Control, Water Science and Technology, Eastern North American Regional Meeting of the Biometric Society, Environmental Toxicology and Chemistry.

DESCRIPTORS: (U) *TOXICOLOGY, *COMPUTER PROGRAMS, *DATA BASES, *BIOMETRY, CHEMISTRY, POLLUTION, RESPONSE, THEORY, THESES, WATER POLLUTION, ENVIRONMENTAL TESTS.

IDENTIFIERS: (U) PE61102F, WUAFJRSR2312A4.

DESCRIPTORS: (U) *CHAIN REACTIONS, *SEROTONIN, AMINO ACIDS, BRAIN, CELLS(BIOLOGY), CIRCADIAN RHYTHMS, CLONES, GENES, MEMBRANES, PHARMACOLOGY, PRIMERS, PROTEINS, SEQUENCES.

IDENTIFIERS: (U) PE61102F, WUAFJRSR2312CS, Indoleamine receptors.

ABSTRACT: (U) We have utilized polymerase chain reaction with primers corresponding to conserved amino acid sequences within membrane-spanning regions of known serotonin receptors to identify clones of 4 putative new indoleamine receptors. We have determined complete amino acid sequences of these 4 receptors which fall into 3 subfamilies; two of these subfamilies are novel. The sites of expression within the brain have been determined for each of the genes. Expression in mammalian cells demonstrates that each new protein is a receptor for serotonin and each has a distinct pharmacology when compared to known receptors. Two of the new receptors are coupled to CAMP, one negatively (G) and one positively (Gs). The latter is a candidate for the serotonin receptor that mediates phase advances in circadian rhythms of the SCN.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A284 410 CONTINUED

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WESTINGHOUSE SCIENCE AND TECHNOLOGY CENTER PITTSBURGH PA

(U) High Temperature Superconducting Films and Multilayers
for Electronics.

DESCRIPTIVE NOTE: Annual rept. 21 Feb 92-20 Feb 93.

FEB 93 30P

PERSONAL AUTHORS: Gavaler, John R.; Talvacchio, John

REPORT NO. 93-9SL2-SUPER-R1

CONTRACT NO. F49820-91-C-0034

PROJECT NO. 2305

TASK NO. GS

MONITOR: AFOSR, XC
TR-93-0284, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reported on four tasks which address problems fundamental to the understanding of the superconducting state in HTS films, the application of HTS films in passive microwave circuits, the realization of HTS digital electronics, and the development of new superconducting devices. An anti-correlation between critical temperature and normal state resistivity was observed at certain compositions in the YBCO, LSCO, and BK80 systems. The criticality of optimizing both oxidation steps involved in YBCO growth to obtain low rf surface resistances was demonstrated. A new insulating material, Sr-Al-Ta-O (SAT), was developed as an epitaxial insulator in multilayer YBCO circuits to replace Sr-Ti-O. The dc resistivity and surface morphology were as good as those of Sr-Ti-O while the real and imaginary parts of the dielectric constant were greatly superior. Systematic studies were made of the processing parameters for step-edge S-N-S YBCO Josephson junctions. The critical parameters for junction reproducibility were found to be a step angle of approximately 15 deg and a high-conductivity normal-metal barrier. All-BK80 tunnel junctions were demonstrated with Sr-Ti-O tunnel barriers which exhibited a superconducting gap structure to within 2K of the transition temperature of the BK80 electrodes.

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Epitaxial Sr-Ti-O films were also used as buffer layers to permit single-orientation BK80 films to be grown on practical La-Al-O or Nd-Ga-O substrates. ... Superconductors, Yttrium, Barium, Copper, Oxides, High, Critical, Temperature, Thin films, Tunneling, Barriers, Sputtering.

DESCRIPTORS: (U) *ELECTRONICS, *FILMS, *HIGH TEMPERATURE, *SUPERCONDUCTIVITY, ANGLES, BARIUM, BARRIERS, BUFFERS, CIRCUITS, CONDUCTIVITY, CONSTANTS, CORRELATION, CRITICAL TEMPERATURE, DIELECTRICS, ELECTRODES, EPITAXIAL GROWTH, JOSEPHSON JUNCTIONS, LAYERS, MATERIALS, METALS, MICROWAVES, MORPHOLOGY, OXIDATION, OXIDES, PARAMETERS, REPRODUCIBILITY, RESISTANCE, SPUTTERING, STRUCTURES, SUBSTRATES, SUPERCONDUCTORS, SURFACES, TEMPERATURE, THIN FILMS, TRANSITION TEMPERATURE, TUNNELING, TUNNELS, YTTRIUM, COPPER, PASSIVITY, DIGITAL SYSTEMS, LANTHANUM, BISMUTH, STRONTIUM, POTASSIUM, RADIOFREQUENCY, ALUMINUM, INSULATION, TITANIUM, NEODYMIUM, GALLIUM.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2305GS, Multilayers, Resistivity, LSCO(Lanthanum Strontium Copper Oxide), BK80(Barium Potassium Bismuth Oxide), SAT(Strontium Aluminum Tantalum Oxide), Step edge.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A284 405 CONTINUED

BUSEK CO INC NEEDHAM MA

(U) A High Thrust Density, C80 Cluster, Ion Thruster.

DESCRIPTIVE NOTE: Final rept. 1 Jul 92-31 Dec 92.

FEB 93 84P

PERSONAL AUTHORS: Hruby, V. J.

REPORT NO. BCI-028-1

CONTRACT NO. F49620-92-C-0039

MONITOR: AFOSR, XC
TR-93-0221, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates. All DTIC reproductions will be in black and white.

ABSTRACT: (U) A C80 fullerene ion thruster represents a major advance in the evolution of electrostatic propulsion. It could provide up to a factor of 30 increase in thrust density over Xe thruster as well as simultaneous reduction of relative losses by a factor of 5.5. Its basic feasibility has been experimentally verified during the Phase I program. Vaporization and discharge chambers as well as simple acceleration grid were designed and constructed. A set of unique experiments were performed which demonstrated: (1) controllable fullerene vapor generation, (2) stable discharge at approximately 190 volts using 2% thoriated tungsten cathode filament, (3) fullerene acceleration with beam ion energy cost of about 900 to 1000 eV/beam ion at a mass utilization of 70%, (4) no detectable fullerene fragmentation due to vaporization, ionization and acceleration, (5) fullerenes in a highly diffused molecular beam were not detected by FTIR spectroscopy, (6) SST, Mo, BN, AlN, Al2O3 and quartz do not react with fullerene vapor during limited exposure, and (7) spacecraft contamination by fullerene thruster effluent is comparable to that predicted for lithium. Methods to reduce it were identified. Fullerene, ion thruster, ion fuel, C80, Electric propulsion.

DESCRIPTORS: (U) *DENSITY, *ELECTRIC PROPULSION,

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*FULLERENES, *IONS, *SPACECRAFT, *THRUST, *THRUSTERS, *CARBON, *ALUMINUM OXIDES, ACCELERATION, CATHODES, CONTAMINATION, EFFLUENTS, ELECTROSTATICS, ENERGY, FILAMENTS, FRAGMENTATION, FUELS, GRIDS, IONIZATION, LITHIUM, LOSSES, MASS, MOLECULAR BEAMS, PHASE, QUARTZ, REDUCTION, SPECTROSCOPY, TUNGSTEN, UTILIZATION, VAPORIZATION, XENON, ION BEAMS, MOLYBDENUM, BORON NITRIDES, NITRIDES, VOLTAGE, ELECTRONS, PLUMES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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TRISTAN TECHNOLOGIES SAN DIEGO CA

NOISE, PHASE, PLATES, RESONATORS, SIMULATION, TEMPERATURE, SUPERCONDUCTIVITY, FILTERS, END ITEMS.

(U) Advanced Microwave Frequency Sources and Filters Based on Superconducting Photonic Band Gap (PBG) Structures.

IDENTIFIERS: (U) *Band gap, Inverse.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 82.

MAR 93 16P

PERSONAL AUTHORS: Crum, Duane; Anderberg, Joseph; Schultz, S.

REPORT NO. 92S8IRPBGFinal

CONTRACT NO. F49820-92-C-0045

PROJECT NO. 1802

TASK NO. 04

MONITOR: AFOSR, XC
TR-93-0291, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The applicability of photonic band gap structures in high Q resonators has been studied. A review of numerical simulations, experiments, and system design studies are presented. These results confirmed the technical feasibility of utilizing, 2-D photonic band gap structures with high temperature superconducting end plates as high Q resonators for fabricating low phase noise oscillators. A particularly important result of the numerical simulations is that inverse structures (dielectric host with air holes) exhibited useful photonic band gap properties. Experiments performed at 10 GHz demonstrated two methods of modulating the defect mode frequency. A supplier of high temperature superconducting films, suitable for millimeter-wave photonic band gap resonators has agreed to collaborate with Tristan Technologies in a Phase II effort. Potential commercial and government applications for photonic band gap resonators with high temperature superconducting end plates have been identified

DESCRIPTORS: (U) *PHOTONICS, *STRUCTURES, *MICROWAVE FREQUENCY, *MICROWAVE OSCILLATORS, AIR, DIELECTRICS, FILMS, FREQUENCY, HIGH TEMPERATURE, MILLIMETER WAVES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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*Mechanisms.

AD-A284 380 7/4 7/2

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Comments on 'On the Concept of Stoichiometry of Reaction Mechanism',

93 2P

PERSONAL AUTHORS: Ross, John

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XC
TR-93-0228, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Physics Chemical, v97 n2798 1p 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) In an article by R. E. Valdes-Perez, views are presented on the relation of reaction mechanisms to stoichiometry which require comment. Valdes-Perez states, The concept of stoichiometry is used in chemistry in different contexts. One use refers to an abstract, balanced transformation of a set of species (reactants) into another set of species (products). Another use refers to the stoichiometry of a reaction mechanism, and is concerned roughly with a balanced transformation of starting materials into final products that is implied by the mechanism. Further, Valdes-Perez states 'the stoichiometry of a mechanism need not be unique, since it depends in some quite ordinary cases on an arbitrary decision of which intermediates shall be regarded as a stoichiometric product.' Finally, 'we have clarified the concept of mechanistic stoichiometry, and its relation to ideal yield, by formalizing the derivation of stoichiometry.'

DESCRIPTORS: (U) *STOICHIOMETRY, *CHEMICAL REACTIONS, CHEMISTRY, MATERIALS, TRANSFORMATIONS, YIELD, REPRINTS, REACTANTS(CHEMISTRY).

IDENTIFIERS: (U) PE81102F. WUAFOSR2303B1. Product.

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STANFORD UNIV CA KNOWLEDGE SYSTEMS LAB

step 1.

(U) Strategic Control of Reactive Behavior in Intelligent Agents.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, ALGORITHMS, BUFFERS, COGNITION, CONTROL, PERCEPTION, PLANNING, REAL TIME, REASONING, PARALLEL PROCESSING, STRATEGIC INTELLIGENCE, COMPUTER ARCHITECTURE.

DESCRIPTIVE NOTE: Final rept. 15 Dec 90-14 Dec 92.

FEB 93 32P

IDENTIFIERS: (U) PE62702F, WUAFOSR558100.

PERSONAL AUTHORS: Hayes-Roth, Barbara; Brownston, Lee; Collinot, Anne

REPORT NO. KSL-93-18

CONTRACT NO. AFOSR-91-0131

PROJECT NO. 5581

TASK NO. 00

MONITOR: AFOSR, XC
TR-93-0212, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A series of experiments was conducted to evaluate the real-time performance of a proposed agent architecture. The architecture is a blackboard architecture whose key features include: distribution of perception, action, and cognition among parallel processes; limited-capacity I/O buffers with best-first retrieval and worst-first overflow; dynamic control planning; dynamic focus of attention; and a satisficing algorithm for the execution cycle. The experiments focus on the architecture's satisficing algorithm for the execution cycle, which is the unit-process of all reasoning and critical to real-time performance. The experiments focus on the architecture's satisficing algorithm for the execution cycle, which is the unit-process of all reasoning and critical to real-time performance. The execution cycle has three steps: (1) notice possible operations; (2) choose the best operation with respect to the current control plan; and (3) execute the chosen operation. Because the executed operations can change the agent's control plan, this cycle allow the agent to dynamically construct and modify plans that control its own behavior. The problem with this cycle in a real-time context is the unbounded time associated with

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Origin of Spontaneous Wave Generation in Excitable Chemical Systems.

92 9P

PERSONAL AUTHORS: Mori, Eugenia; Ross, John

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0224, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v98 n20 p8054-8060, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We investigate the origin of spontaneous chemical wave generation in an excitable Belousov-Zhabotinskii system. We solve one-dimensional reaction-diffusion equations of an Oregonator model with the initial profiles possessing an excitation of varying concentration of either $HBrO_2$ or $Br(-)$ and the excitation occurs within a region of different length. The concentration of the threshold excitation necessary for a wave to propagate depends on the length within which the initial excitation is applied. We further perform an equilibrium stochastic calculation of the recurrence time for a thermal fluctuation to induce a change in concentration of a sufficient magnitude within a sufficient volume for a wave to propagate. The smallest recurrence time calculated is 10(exp 17). We compare our results with previous experiments and calculations and conclude from all the evidence that an internal thermal fluctuation is highly unlikely to generate a chemical wave in an excitable chemical solution.

DESCRIPTORS: (U) *EQUATIONS, *CHEMICAL REACTIONS, CHEMICALS, DIFFUSION, EXCITATION, INTERNAL, LENGTH, MODELS, ONE DIMENSIONAL, PROFILES, VOLUME, WAVE PROPAGATION, CONCENTRATION(CHEMISTRY); HYDROGEN, BROMINE.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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MINNESOTA UNIV MINNEAPOLIS DEPT OF CHEMICAL ENGINEERING
AND MATERIALS SCIENCE

NICHOLS RESEARCH CORP NEWPORT BEACH CA

(U) Structural Development in Ceramic Precursor Solis and
Gels.

(U) Outlier Detection in Infrared Signatures.

DESCRIPTIVE NOTE: Final rept. 15 Mar 89-14 Sep 92,

DESCRIPTIVE NOTE: Final rept. 15 Mar 89-14 Mar 92,

JAN 92 24P

MAR 93 52P

PERSONAL AUTHORS: Chernick, Michael; Magnuson, Jon A.

PERSONAL AUTHORS: Mecartney, Martha L.

CONTRACT NO. F49620-89-C-0050

PROJECT NO. 2303

TASK NO. A5

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0218, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The effect of water of hydrolysis on nucleation, crystallization, and microstructural development of sol-gel derived single phase LiNbO₃ thin films has been studied using transmission electron microscopy (TEM), atomic force microscopy (AFM), x-ray diffraction (XRD), and differential lithium and niobium in ethanol was used for the preparation of sol. DSC results indicated that adding water to the solution for hydrolysis of the double ethoxides lowered the crystallization temperature from 500 deg C (no water) to 390 deg C (2 moles water per mole ethoxide). The amount of water has no effect on the short range order in amorphous LiNbO₃ gels but rendered significant microstructural variations for the crystallized films. AFM studies indicated that surface roughness of dip coated films increased with increasing water of hydrolysis

DESCRIPTORS: (U) *CERAMIC MATERIALS, *PRECURSORS, *GELS, *CRYSTAL STRUCTURE, WATER, HYDROLYSIS, NUCLEATION, CRYSTALLIZATION, LITHIUM NIOBATES, OXIDES, NIOBIUM, ETHANOLS, TEMPERATURE, THIN FILMS, SURFACE ROUGHNESS, COATINGS, GLASS, HEAT TREATMENT.

IDENTIFIERS: (U) *Sol-Gel Process, Ethoxides, PE61102F

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ABSTRACT: (U) For a number of years, simulated long wavelength infrared (LWIR) signatures have been used to determine the ability to classify military targets and decoys. Such signatures sometimes exhibit specular behavior, a characteristic displaying a sudden increase in radiant intensity of short duration. This specular behavior is sporadic and is as likely to show up for targets as it is for decoys. Unfortunately, if these outliers (i.e. the specular occurrences) are not removed from the data, the estimated performance of discrimination algorithms can be misleading. Statistical outlier detection provides an useful approach for finding and removing the outliers caused by specular occurrences. This paper considers the statistical properties of the outlier detection algorithms as applied to simulated LWIR signatures. We consider possible statistical models for outliers in order to determine whether or not modifications might minimize the number of outliers left in the signature after editing and minimize the number of good observations deleted from the signature. Ultimately, we are seeking the data editing algorithm which produces the best possible discrimination performance.

DESCRIPTORS: (U) *INFRARED DETECTION, *INFRARED SIGNATURES, ALGORITHMS, BEHAVIOR, DECOYS, DISCRIMINATION, EDITING, LONG WAVELENGTHS, MODELS, MODIFICATION, NUMBERS, OBSERVATION, RADIANT INTENSITY, TARGETS.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Thermodynamic and Stochastic Theory for Nonequilibrium Systems and Multiple Reactive Intermediates: The Concept and Role of Excess Work.

JAN 92

14P

PERSONAL AUTHORS: Ross, John; Hunt, Katharine L.; Hunt, Paul

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0223, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v96 n1 p818-828, 1 Jan 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The authors continue their development of a global thermodynamic and stochastic theory of open chemical systems far from equilibrium with an analysis of a broad class of isothermal, multicomponent reaction mechanisms with multiple steady states, studied under the assumption of local equilibrium. They generalize species-specific affinities of reaction intermediates, obtained in prior work for nonautocatalytic reaction mechanisms, to autocatalytic kinetics and define with these affinities an excess free energy differential.

DESCRIPTORS: (U) *PHYSICAL CHEMISTRY, *THERMODYNAMICS, *REACTION KINETICS, NONEQUILIBRIUM FLOW, STOCHASTIC PROCESSES, REPRINTS, STABILITY, STEADY STATE.

IDENTIFIERS: (U) PE61102F

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8/1

OHIO STATE UNIV COLUMBUS COLL OF PHARMACY

(U) Xenobiotic Kinetics and Toxicity Among Fish and Mammals.

DESCRIPTIVE NOTE: Final rept.,

MAR 93

20P

PERSONAL AUTHORS: Hayton, William L.

CONTRACT NO. AFOSR-90-0349

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0255, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project is to develop techniques that account for interspecies differences in the pharmacokinetics of xenobiotics. The hypothesis proposed is that toxicity occurs after exposure of the target organ to a characteristic concentration of the toxicant for a particular period of time. To test the hypothesis, experiments were proposed to characterize the pharmacokinetics of three representative chemicals (lindane, pentachlorophenol and paraoxon) in small trout via water exposure, and large trout and rats via intravascular injection. Compartmental toxicokinetic models were to be used. The fraction of a dose of each test compound converted to each of its metabolites by the test animals were to be determined to account for possible metabolic differences that might contribute to interspecies differences in toxicity. Binding of the test substances in blood to formed elements and plasma proteins were to also be characterized. The LC50s and LD50s of the test compounds were to be determined and the values were to be converted to free concentrations using various toxicokinetic transformations. The transformation that gave a common concentration for toxicity in the three groups of animals were to be an 'index of relative exposure' that would provide an estimate of the dose to the target organ rather than the dose to the animal. The area under the free concentration-time curve was to be

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the starting point for development of the exposure index. Successful development of such an index should result in substitution for research purposes of fish for mammalian species, and in a better understanding of interspecies differences in the dosage of chemicals that produce toxicity. The research was also to provide useful information about the toxicokinetic and toxicologic properties of the test compounds.

DESCRIPTORS: (U) *FISHES, *PHARMACOKINETICS, *TOXICITY, *MAMMALS, ANIMALS, BLOOD PROTEINS, CHEMICALS, DOSAGE, INJECTION, METABOLITES, MODELS, RATS, TARGETS, TEST AND EVALUATION, TRANSFORMATIONS, TROUT, WATER, ORGANS(ANATOMY), CHEMICAL COMPOUNDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A3, *Xenobiotic kinetics, Lindane, Pentachlorophenol, *Paraoxon, Intravascular injection, Interspecies differences, Index of relative exposure.

AD-A284 345 5/8

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF PSYCHOLOGY

(U) Neural Mechanisms of Attention.

MAR 93 12P

PERSONAL AUTHORS: Olton, David S.

CONTRACT NO. AFOSR-89-0481

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XC
TR-83-0254, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project attained its objectives of developing an animal model to examine the neural mechanisms of attention. The concepts and procedures were successfully produced and resulted in two publications describing the experimental strategy and the results. The last part of the project examined the role of the basal forebrain cholinergic system and its projections to the frontal cortex. This system is important for attention as assessed in the two-choice reaction time task. These results have implications for behavioral, cognitive, and neural descriptions of the mechanisms involved in attention... Attention, Frontal cortex, Divided attention, Cholinergic system.

DESCRIPTORS: (U) *ATTENTION, *NEURAL NETS, ANIMALS, COGNITION, MODELS, REACTION TIME, SELECTION, STRATEGY, TIME, VALIDATION, TEST METHODS, BEHAVIOR, HUMANS, NERVOUS SYSTEM, PERCEPTION(PSYCHOLOGY), PERFORMANCE TESTS, PSYCHOLOGY.

IDENTIFIERS: (U) PE81102F, AFOSR2313A4, *Neural mechanisms, Frontal cortex

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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FLORIDA UNIV GAINESVILLE

(U) Metastability in Molecules.

DESCRIPTIVE NOTE: Final rept. 1989-1992.

MAR 93 24P

PERSONAL AUTHORS: Bartlett, Rodney J.

CONTRACT NO. AFOSR-89-0207

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0250, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Pentazole (HN5) has the fingerprints of a metastable molecule since even though it offers a perfectly logical, even aromatic electronic structure, it is unknown experimentally. We subjected HN5 to theoretical analysis. At the correlated level we find that for the reaction, $2\text{HN5} \rightarrow 5\text{N}_2 + \text{H}_2$ DeltaE is -129.1 kcal/mol resulting in an I(sub sp) of 346 as a monopropeilant. Considering that derivatives of the basic structure should be made to stabilize the pentazole ring, we can consider some which will be quite energetic (examples include nitropentazole, and a bipentazole analogous to biphenyl and possibly a dinitramine pentazole (O2N)N-N5, and numerous metal, MN5 structures, where M could be Li e.g.. The prospects for actually making and using pentazoles is promising. Several recent methodology developments have been accomplished in this project. These methods, mostly unique to our effort, make it possible to perform high-level, accurate correlated calculations on much larger potential metastable species than was previously possible. These include the following:

- (1) Direct product decomposition approach to the full use of Abelian symmetry in coupled-cluster and MBPT applications.
- (2) Restricted open-shell Hartree Fock (ROHF) based CC and MBPT methods.
- (3) Analytical first derivatives (i.e. gradient) for open-shell CC/MBPT methods.... Metastable, Molecules, HEDM.

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DESCRIPTORS: (U) *MOLECULES, *METASTABLE STATE, BIPHENYL, DECOMPOSITION, ELECTRONICS, GRADIENTS, METALS, METHODOLOGY, MONOPROPELLANTS, RINGS, SYMMETRY, ELECTRONIC STATES, AZOLES, AROMATIC COMPOUNDS, ENERGETIC PROPERTIES, EXPLOSIVES, NITRAMINES, HARTREE FOCK APPROXIMATION, QUANTUM CHEMISTRY, MOLECULAR STRUCTURE, CHEMICAL BONDS, ACTIVATION, BARRIERS, HEAT OF REACTION, EXCITATION, VIBRATIONAL SPECTRA, NITROGEN.

IDENTIFIERS: (U) PE61102F, WUAFQSR230383, *Pentazole ring, Abelian symmetry, ROHF(Restricted Open-Shell Hartree Fock), Nitropentazoles, Ab initio calculations, CC(Coupled-Cluster), MBPT(Many Body Perturbation Theory).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL
ENGINEERING

ITERATIONS, ELECTRICAL PROPERTIES, MICROSTRUCTURE,
VALENCE, DOPING, SUBSTRATES, ZINC, SULFUR, SELENIUM,
CURRENT DENSITY, PULSES, QUANTUM EFFICIENCY, NITROGEN,
TELLURIUM, LAYERS, RESISTANCE.

(U) II-VI Semiconductor Superlattices.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Nov 92,

IDENTIFIERS: (U) Photonic devices, LED(Light Emitting
Diode), Lasing, Heterovalent, PE8102F, WJAFOSR230881

DEC 92 25P

PERSONAL AUTHORS: Gunshor, R.L.; Otsuka, N.

CONTRACT NO. AFOSR-89-0438

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR, XC
TR-03-0245, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The first operational semiconductor diode
lasers were demonstrated in the summer of 1991
independently by two US groups, one at 3M and the other a
team effort shared by Purdue and Brown Universities. As a
result of the close collaboration between MBE and TEM
groups within the grant, the structures for lasing and
LED (as well as display device) operation were realized
with the lowest defect concentrations ever reported for
II-VI structures grown on GaAs by MBE. The reduction of
the dislocation levels resulted from an iterative process
where the growth could be modified in response to the TEM
analysis. The AFOSR funded interface studies have led to
our appreciation of the electrical and microstructural
considerations obtaining at II-VI/III-V heterovalent
interfaces. As a result the Purdue/Brown group has had
equal success in making laser diodes with substrates of
both doping types. The Purdue/Brown collaboration has
obtained CW operations at 77K as well as pulsed operation
at room temperature using a Zn(S,Se)-based device
configuration emitting in the blue (490nm at room
temperature)

DESCRIPTORS: (U) *SUPERLATTICES, SEMICONDUCTORS, GROUP
IV COMPOUNDS, PHOTONS, LIGHT EMITTING DIODES, LASERS,
DISPLAY SYSTEMS, CRYSTAL DEFECTS, GALLIUM ARSENIDES,
MOLECULAR BEAMS, EPITAXIAL GROWTH, DISLOCATIONS.

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YALE UNIV NEW HAVEN CT

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effects are found when subjects have lexically encoded the relationship - although further results indicate that qualitative gradients are present in purely perceptual judgments.... Object Representation, Object Recognition, Visual Cognition.

(U) Representations of Shape in Object Recognition and Long-Term Visual Memory.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 92-14 Jan 93.

FEB 93 31P

PERSONAL AUTHORS: Tarr, Michael J.

DESCRIPTORS: (U) *RECOGNITION, *MEMORY(PSYCHOLOGY), *VISUAL PERCEPTION, BOUNDARIES, COGNITION, GRADIENTS, INTERACTIONS, LEARNING, TRACKS, PERFORMANCE(HUMAN), PERCEPTION(PSYCHOLOGY).

CONTRACT NO. F49620-92-J-0169

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS, WUAFOSR2313BS.

PROJECT NO. 2313, 2313

TASK NO. AS, BS

MONITOR: AFOSR, XC
TR-93-0237, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of studies examining the mechanisms and representations underlying human object recognition have been conducted. One track has investigated the role of view-based object representations in perception and recognition. Results indicate that certain classes of viewpoint-dependent features may be used to define boundaries between characteristic views of objects. A second track has investigated the interaction between orientation-dependent and orientation-independent recognition mechanisms. Results here indicate that humans learn both object-based, orientation-independent and view-based, orientation-dependent representations regardless of the initial learning context. Other results indicate that task conditions mediate whether structural descriptions or episodic representations of objects are used in performing an implicit memory task. Finally, a third track has investigated the nature of spatial relations between objects, as well as the relationship between perceptual and lexical representations of spatial relations. Results indicate that spatial prepositions (e.g., above, left) encode the relationship between figural and reference objects as a gradient that decreases with distance from the qualitative or veridical position. Moreover, results indicate that this may in part be a lexical effect, in that stronger qualitative

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YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 92-31 Jan 93,

MAR 93 24P

PERSONAL AUTHORS: Chang, Richard K.; Long, Marshall B.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0240, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress has been made in the following areas: (1) Nonlinear spectroscopy of micrometer sized droplets, and (2) Development and application of two- and three-dimensional scalar and velocity measurement techniques in flames. In the nonlinear spectroscopy area, the following achievements are reported: (1) Fluorescence seeding of the stimulated Raman scattering (SRS) in order to increase the detectivity (by as much as 10X) of minor species in a multicomponent liquid droplet that contains a fluorescent dye; (2) Temporal precession of the SRS as a means of determining the shape distortion (7 parts out of 10(exp 3)) of a flowing droplet because of inertial force; (3) Preliminary measurements of the relative evaporation rates of 15 droplets in a segmented stream where the few lead droplets evaporate faster than the remaining droplets; and (4) Suppression of lasing by the SRS and amplification of the SRS in microdroplets, leading to an increased SRS signal. ... Droplets, Spray, Evaporation rate, Shape distortion, Precession of cavity modes and Lasing, Premixed flames, Nonpremixed flames, Rayleigh scattering, Laser-induced fluorescences, Three-dimensional measurements, Laser diagnostics, Flow imaging, Supersonic flow, Mixture fraction and Scalar dissipation.

DESCRIPTORS: (U) *FLAMES. *SPECTROSCOPY, *NONLINEAR

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OPTICS, ACETALDEHYDE, AMPLIFICATION, CAMERAS, CAVITIES, CHARGE COUPLED DEVICES, DIFFUSION, DISSIPATION, DISTORTION, EVAPORATION, FLOW, FLUORESCENCE, FLUORESCENT DYES, IMAGES, LASERS, LIQUIDS, LUMINOSITY, MEASUREMENT, METHANE, MICROMETERS, MIXTURES, PARTICLES, PRECESSION, QUANTITY, RATES, RAYLEIGH SCATTERING, SCATTERING, SEEDING, SEGMENTED, SHAPE, SIGNALS, SPRAYS, STREAMS, SUPERSONIC FLOW, SUPPRESSION, THREE DIMENSIONAL, TOMOGRAPHY, VELOCITY, DROPS, TWO DIMENSIONAL, SCALAR FUNCTIONS, CHEMICAL COMPOSITION, FUELS, RAMAN SPECTRA, INERTIA, DIAGNOSTIC EQUIPMENT.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308CS, Nonpremixed flames, Mixture-fraction, Premixed flames.

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CALIFORNIA UNIV SAN DIEGO LA JOLLA

COLORADO UNIV AT BOULDER DEPT OF PHYSICS AND ASTROPHYSICS

(U) Sensitive Detection of New Superconductors Created at Ultra High Pressures.

(U) Applications of the Photorefractive Effect and Damage Induced Effects in Fibers.

DESCRIPTIVE NOTE: Final rept. 1 Aug 90-31 Jan 93.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-31 Oct 92.

JAN 93 9P

OCT 92 34P

PERSONAL AUTHORS: Schultz, Sheldon

PERSONAL AUTHORS: Anderson, Dana Z.

CONTRACT NO. AFOSR-90-0365

CONTRACT NO. AFOSR-90-0188

PROJECT NO. 2308

PROJECT NO. 2301

TASK NO. C1

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0246, AFOSRMONITOR: AFOSR, XC
TR-93-0247, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In the original proposal we presented the evidence that by utilizing Low Field Modulated Microwave (LFMM) spectroscopy we could sensitively detect the onset of superconductivity in either films, pellets, or single crystals. The technique does not require leads, nor a percolation path, and is unperturbed by the presence of other non-superconducting phases. We suggested that by incorporating this technique in conjunction with the diamond anvil cell approach to high pressures, we could open up new opportunities for rapidly and sensitively studying the significant phase space corresponding to the pressure axis. The primary goal was to detect new normal metal to superconducting phase transitions, starting for example, with those copper compounds for which interesting transitory pressure effects had been reported many years prior to the discovery of the superconducting cuprates

DESCRIPTORS: (U) *SUPERCONDUCTORS, *DETECTION, *HIGH PRESSURE, SENSITIVITY, SPECTROSCOPY, FILMS, PELLETS, SINGLE CRYSTALS, DIAMONDS, METALS, PHASE TRANSFORMATIONS, COPPER, ELECTRON SPIN RESONANCE.

IDENTIFIERS: (U) Ultra high, LFMM(Low Field Modulated Microwave), Anvil cell method, WUFOSR2306C1

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ABSTRACT: (U) This focus is two-fold. One aspect concerns photoinduced effects in fibers, especially the processes of self-organized second-harmonic generation in fibers. For the most part we have developed the microscopic theory of defect formation in glass. The basic physics involved in second-harmonic generation in fibers has to led to a number other possible experiments and applications. For example it is known that a photogenerated current cannot be produced by a single optical beam illuminating a centrosymmetric medium but it is now recognized that a current can be generated in a centrosymmetric medium by illumination with two harmonically related optical fields. However, we have concluded that as an application, self-organized second-harmonic generation in fibers does not appear to be a practical means of frequency doubling conventional lasers. Thus until a conceptual or practical breakthrough occurs, we have brought to a close the experimental and theoretical work on this subject

DESCRIPTORS: (U) *FIBER OPTICS, *GRATINGS(SPECTRA), *GLASS FIBERS, FIBERS, DEFECTS(MATERIALS), DOPING, SECOND HARMONIC GENERATION, OPTICAL FILTERS, RESONATORS.

IDENTIFIERS: (U) *Photorefraction, Photorefractive materials

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VANDERBILT UNIV NASHVILLE TN DEPT OF PHYSICS AND ASTRONOMY

demands that are being placed on the mental capacities of people who live and work in our modern, post-industrial society

(U) Report of the 1992 AFOSR Workshop on the Future of EEG and MEG.

DESCRIPTIVE NOTE: Final rept. 1 Apr 92-30 Sep 92.

FEB 93 41P

DESCRIPTORS: (U) *ELECTROENCEPHALOGRAPHY, *MAGNETOENCEPHALOGRAMS, *NEUROPHYSIOLOGY, *BRAIN, *COGNITION, OPTICAL IMAGES, BRAIN DAMAGE, DIAGNOSIS(MEDICINE), INTELLIGENCE(HUMANS), MEDICAL RESEARCH, DISEASES, WORKSHOPS, SYMPOSIA.

PERSONAL AUTHORS: Wikswo, John, Jr.; Gevins, Alan; Williamson, Samuel J.

IDENTIFIERS: (U) PET(Positron Emission Tomography)

CONTRACT NO. F49620-92-J-0214

PROJECT NO. 2305

TASK NO. GS

MONITOR: AFOSR, XC
TR-93-0258, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with EEG Systems Lab, San Francisco, CA and New York Univ., Dept. of Physics, New York, NY.

ABSTRACT: (U) A workshop on the prospects of the electroencephalogram (EEG) and the magnetoencephalogram (MEG) for elucidating human brain function was held at Virginia Beach, Virginia from May 17-22 1992. The purpose of the workshop was to discuss the EEG and the MEG in relation to other rapidly advancing imaging modalities such as PET, SPECT, and functional MRI (fMRI), and in terms of the recognized research, medical, and personnel evaluation needs for advanced brain imaging. Medical areas where these and other advanced technologies will undoubtedly be utilized include the diagnosis and treatment of diseases of the brain such as epilepsy, Alzheimer's and schizophrenia; the monitoring and facilitation of recovery of function from head trauma and stroke, and the quantitative assessment of the effect on the brain of toxins and other bioenvironmental hazards. Non-medical applications of these techniques include a furthering of our understanding of the factors that are limiting the development and full utilization of human intelligence, particularly in recognition of increasing

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PURDUE UNIV LAFAYETTE IN DEPT OF MATERIALS ENGINEERING

Mechanics, Stochastic, Elasticity, Two-dimensional.

(U) Damage Mechanics in 2-D and 3-D Microstructures.

DESCRIPTORS: (U) *DAMAGE, *FAILURE(MECHANICS),
*MICROSTRUCTURE, COMPUTERS, CONDUCTIVITY, FAILURE,
HARDNESS, MATERIALS, MODELS, PLASTIC PROPERTIES,
POLYCRYSTALLINE, RESOURCES, RESPONSE, STRATEGY, TWO
DIMENSIONAL, BRITTLENESS, THREE DIMENSIONAL.

DESCRIPTIVE NOTE: Final rept. Jul 89-Jun 92,

FEB 93 SOP

PERSONAL AUTHORS: Bowman, Keith J.; Ostoja-Starzewski,
Martin

IDENTIFIERS: (U) PE61102F, WUAFOSR2302BS.

CONTRACT NO. AFOSR-89-0423

PROJECT NO. 2302

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0213, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Michigan
State Univ., Dept. of Met. Mech. and Materials.

ABSTRACT: (U) The evolution of damage and strategies for
assessing damage when it has occurred in structural
materials is the primary focus of this research program.
The research effort is collaborative one on mesomechanics
called 'Damage in 2D and 3D Microstructures' (AFOSR-89-
0423). What distinguishes this effort from others is the
attempt to perform incisive model experiments to assist
in evaluating stochastic models for constitutive laws
(elasticity and conductivity) mechanical response
plasticity and hardness and associated damage processes.
The theoretical models are designed to be elegant and
efficient in the use of computing resources as opposed to
brute force procedures which handle systems with
different scales by scaling up the size of the computer.
The essence of this work is to explore sample size
microstructure relationships via stochastic models which
reflect the same types of variability present in the
response of real materials. This leads directly to
concerns with effective properties of materials. Thus,
research integrates the effects of microstructure and
preferred orientation on the effective tensorial
properties of polycrystalline materials....
Microstructure, Damage, Brittle Fracture, Failure.

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VIRGINIA UNIV CHARLOTTEVILLE DEPT OF ASTRONOMY

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) The 12 UM Contribution of Nearby Galaxies to the Infrared Background.

(U) Qualitative Methods in Computer Vision.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 81-30 Sep 82.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-30 Sep 92.

APR 93

5P

JAN 93

10P

PERSONAL AUTHORS: Thuan, Trinh X.

PERSONAL AUTHORS: Rosenfeld, Azriel

CONTRACT NO. AFOSR-89-0487

CONTRACT NO. AFOSR-91-0239

PROJECT NO. 2311

PROJECT NO. 2304

TASK NO. BS

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0241, AFOSRMONITOR: AFOSR, XC
TR-93-0214, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The far infrared properties of normal non-infrared-bright galaxies were studied as a function of their morphological type using a sample of 1544 galaxies of magnitude less than 14.5. Most of the far infrared color trends as a function of galaxian morphological type can be reproduced by dust models with three components, combined with an appropriate dust heating spectral energy distribution. Work has been done on the use of far infrared luminosity as a star formation indicator in galaxies. The trends observed are consistent with a two-component model, with the dust fraction as the second parameter and the star formation rate as the first parameter. Observations have been made and studies performed on dwarf and low surface brightness galaxies and starburst galaxies at intermediate red shifts.

DESCRIPTORS: (U) *FAR INFRARED RADIATION, *GALAXIES, *STARS, BRIGHTNESS, COLORS, DUST, ENERGY, HEATING, INDICATORS, LUMINOSITY, MODELS, OBSERVATION, SPECTRAL ENERGY DISTRIBUTION.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2311BS.

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ABSTRACT: (U) Current object recognition systems can only recognize a limited class of objects. Objects having variable numbers of parts and only loosely constrained shapes cannot be modeled and recognized by these systems. The PI proposed the use of a data structure called the VAPOR (Variable Appearance Object Representation) model to represent objects with these kinds of variable appearances and develop a search procedure called MOSS (Model Space Search) to find instances of these models in two-dimensional image data. The VAPOR model is an idealization of the object; all instances of the model in the image are variations from ideal appearance. The variations are evaluated by the description length of the model, measured in information-theoretic bits. MOSS selects the best model for the given image data by choosing the minimal length description. It was demonstrated how the system performs in a simple domain of circles and polygons and in the complex domain of finding cloverleaf intersections in aerial images of roads.

DESCRIPTORS: (U) *COMPUTER VISION, *IMAGE PROCESSING, CIRCLES, IMAGES, LENGTH, POLYGONS, REPORTS, ABSTRACTS, ROADS, SHAPE, TWO DIMENSIONAL, INFORMATION THEORY, VAPORS, VARIABLES, VARIATIONS.

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IDENTIFIERS: (U) WUAFOSR2304A7. *Object recognition.

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND
ENGINEERING

(U) Fundamental Studies of the Mechanical Behavior of
Microelectronics Thin Film Materials.

DESCRIPTIVE NOTE: Final rept. 15 Nov 88-31 Dec 92,

APR 93 38P

PERSONAL AUTHORS: Nix, William D.

CONTRACT NO. AFOSR-89-0185

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR. XC
TR-93-0272, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This document represents a final technical report for AFOSR Grant No. 89-0185. The research program supported under this grant involved a fundamental study of the mechanical properties of microelectronic thin film materials. The focus of the work was on the microscopic processes that lead to stresses in microelectronic thin films and control the mechanical properties of these materials. Our work ranged from studies of interconnect metals, passivation glasses and heteroepitaxial thin film semiconductors. In previous reports we highlighted work done of the mechanical properties of passivation glasses and interconnect metals and the processes of failure of interconnect metals. In this final report we highlighted our work on misfit dislocation formation in heteroepitaxial thin films. The body of the report contains two reports of our work on misfit dislocations. Our overall understanding of misfit dislocations in Si-Ge layers is described in the first report. That report also describes our work on the effect of capping layers on the formation of misfit dislocations. The second report describes our in situ studies of the kinetics of formation of misfit dislocations in Si-Ge films. By measuring the change of substrate curvature as a function of time during annealing we were able to determine the way in which mobile threading dislocation

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density changes during the course of annealing.

CINCINNATI UNIV OH

DESCRIPTORS: (U) *MICROELECTRONICS, *THIN FILMS, ANNEALING, CAPPING, CONTROL, CURVATURE, DENSITY, DISLOCATIONS, EYEGLASSES, FAILURE, FILMS, FUNCTIONS, KINETICS, LAYERS, MECHANICAL PROPERTIES, METALS, MOBILE, SEMICONDUCTORS, SILICON, STRESSES, SUBSTRATES, GLASS, EPITAXIAL GROWTH, HETEROGENEITY, GERMANIUM.

(U) Simulation, Characterization and Control of Forced Unsteady Viscous Flows Using Navier-Stokes Equations.

DESCRIPTIVE NOTE: Final rept. Feb 90-May 92,

NOV 92 133P

IDENTIFIERS: (U) WUAFOSR2305C1, Interconnect metals, Passivation, Misfit, In situ studies.

PERSONAL AUTHORS: Ghia, K. N.; Ghia, U.

REPORT NO. AFL-RN-82-11-78

CONTRACT NO. AFOSR-90-0249

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0207, AFOSR

UNCLASSIFIED REPORT

ABSTRACT. (U) A two-and-a-quarter-year multi-tasked research project was pursued by the present investigators to study dynamic stall phenomenon under AFOSR sponsorship between February 1990 - May 1992. The major objective of this study was to predict and control the dynamic stall phenomenon in 2-D and 3-D flows. In the process of achieving these objectives, significant effort was directed towards developing mathematical models and the corresponding computational methods which were made available to interested researchers and organizations involved in computational fluid dynamics (CFD) research. The analyses developed included a two-dimensional Navier-Stokes (NS) analysis for a general body undergoing arbitrary three-degree-of-freedom maneuvers; detailed results are provided for this class of flows. For enhancement of accuracy and efficiency, an adaptive-grid time-accurate flow solution technique has been developed to enable improved resolution of the various length scales in a vortex-dominated unsteady flow. A multi-block grid generation analysis is developed for a 3-D rectangular planform wing. For the corresponding flow analysis using velocity-vorticity variables and direct-solution philosophy, the difficulties experienced were clearly discussed in the annual report submitted a year

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ago in November 1991. This 3-D flow analysis was therefore temporarily set aside. It will be pursued further in a subsequent grant, and the progress made on it will be reported in a forthcoming annual report for that grant. In the current grant, the study of 3-D flows was continued, using an iterative solution methodology. Hence, a 3-D unsteady Navier-Stokes analysis, again using velocity-vorticity variables, and an iterative solution technique with multi-grid acceleration have been developed.

DESCRIPTORS: (U) *COMPUTATIONAL FLUID DYNAMICS, *NAVIER STOKES EQUATIONS, *UNSTEADY FLOW, *VISCOUS FLOW, ACCELERATION, ACCURACY, AIRFOILS, ANGLE OF ATTACK, ATTACK, AUGMENTATION, BODIES, CAVITIES, CONTROL, DELAY, DELTA WINGS, EDGES, EFFICIENCY, FLUID DYNAMICS, GRANTS, GRIDS, HIGH ANGLES, INJECTION, LAYERS, LEADING EDGES, LENGTH, MANEUVERS, MATHEMATICAL MODELS, METHODOLOGY, ORGANIZATION, PLANFORM, RESOLUTION, ROCK, RUPTURE, SEPARATION, STRATEGY, SUCTION, THESES, TIME, TWO DIMENSIONAL, VARIABLES, VELOCITY, WINGS, WORK, TWO DIMENSIONAL FLOW, THREE DIMENSIONAL FLOW.

IDENTIFIERS: (U) WUAFOSR2307A3.

ARIZONA STATE UNIV TEMPE DEPT OF INDUSTRIAL AND MANAGEMENT SYSTEMS ENGINEERIN G

(U) Studies of the Effect of Image Degradation and Recombination on Visual Perception.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 92-1 Mar 93,

APR 93 8P

PERSONAL AUTHORS: Uttal, William R.

REPORT NO. PERLAB-1

CONTRACT NO. F49620-92-J-017B

PROJECT NO. 2313, 1123

TASK NO. AS, 00

MONITOR: AFOSR, XC
TR-93-0263, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year of this grant progress was made on two major series of experiments. In the first, we examined the effect of noise, brightness, contrast, and geometrical artifacts on a detection task simulating enhanced night vision devices in a series of 10 experiments. An article has been submitted based on this study. In the second, we explored the effects of noise, Fourier filtering, reduced acuity (by means of blocking) and combinations thereof in a discrimination task. Ten experiments also have been carried out in this series and are now being analyzed and a publication is being prepared.

DESCRIPTORS: (U) *NIGHT VISION DEVICES, *RESEARCH MANAGEMENT, ACUITY, ARTIFACTS, BLOCKING, BRIGHTNESS, CONTRAST, DETECTION, DISCRIMINATION, FILTRATION, GRANTS, NIGHT, NIGHT VISION, NOISE, EXPERIMENTAL DATA.

IDENTIFIERS: (U) PE81102F, PE82205F, WUAFOSR2313AS, WUAFOSR112300.

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COLORADO UNIV AT BOULDER LAB FOR ATMOSPHERIC AND SPACE PHYSICS

(U) Numerical Modeling and Parameterization of Gravity Wave Processes and Effects in the Atmosphere.

DISSIPATION, ENERGY, FREQUENCY, GRAVITY, HIGH FREQUENCY, INSTABILITY, INTERACTIONS, MIXING, MOMENTUM, MOTION, PHYSICS, PROFILES, PROPAGATION, SHAPE, STABILITY, THREE DIMENSIONAL, TRANSVERSE, TWO DIMENSIONAL, VARIATIONS, VORTICES, WAVE PROPAGATION, WIND, PARAMETRIC ANALYSIS.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 92.

IDENTIFIERS: (U) PE81102F, WJAFOSR2310CS.

DEC 92 5P

PERSONAL AUTHORS: Fritts, David C.

CONTRACT NO. F48620-92-J-0138

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XC
TR-83-0282, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A nonlinear, compressible, spectral collocation code has been developed to examine gravity wave breaking and instability processes in two and three spatial dimensions. Initial studies have demonstrated that the preferred mode of instability within a high-frequency gravity wave is a convective instability comprised of counter-rotating vortices aligned transverse to the direction of wave propagation (a horizontal wavenumber normal to that of the gravity wave). Thus, wave instability is inherently three-dimensional, and two-dimensional models are unlikely to adequately describe either the physics of wave breaking or the implications for wave transports and eddy mixing. A parallel effort has emphasized the statistical effects of wave interactions and dissipation processes and developed a new spectral parameterization of gravity wave transports of energy and momentum and their atmospheric effects. This scheme relies on the approximately universal spectral shape of the gravity wave motion field throughout the atmosphere to assess the potential for wave transports and variations with background wind and stability profiles.

DESCRIPTORS: (U) *ATMOSPHERE MODELS, *MATHEMATICAL MODELS, ATMOSPHERES, ATMOSPHERICS, BACKGROUND, COUNTERS.

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NORTHWESTERN UNIV EVANSTON IL

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Center for Surface Radiation Damage Studies.

(U) Origin of Spontaneous Wave Generation in an Oscillatory Chemical System.

DESCRIPTIVE NOTE: Final rept. 15 Sep 89-30 Nov 82.

92 8P

FEB 93 29P

PERSONAL AUTHORS: Marks, Laurence D.

PERSONAL AUTHORS: Zhang, Yi-Xue; Foerster, Petra; Ross, John

REPORT NO. 0850-350-W410

CONTRACT NO. AFOSR-81-0215

CONTRACT NO. AFOSR-90-0045

PROJECT NO. 2303

PROJECT NO. 3484

TASK NO. B1

TASK NO. CS

MONITOR: AFOSR, XC

TR-93-0273, AFOSR

MONITOR: AFOSR, XC
TR-93-0273, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research focussed around understanding surface damage processes at the atomistic microstructure level was performed using high resolution electron microscopy in ultra-high vacuum and by other techniques. Techniques for obtaining clean and well-ordered surfaces and understand the image obtained have been developed and used to characterize damage processes. This data, combined with other high resolution electron microscopy data has been combined with analytical and numerical models with a high degree of success. Attempts to produce a small atomic oxygen source based upon electron stimulated desorption of oxygen neutrals led to the conclusion that literature estimates are much too high for the neutral to ion ratio. We have placed a strong upper bound on this ratio of < 10 , whereas values in the literature are as high as 10^4 . Surface Radiation Damage, Electron Microscopy, Electron Stimulated Desorption.

DESCRIPTORS: (U) *ELECTRON MICROSCOPY, *RADIATION DAMAGE, *ATOMIC STRUCTURE, DAMAGE, DESORPTION, ELECTRONS, HIGH RESOLUTION, HIGH VACUUM, IMAGES, IONS, MICROSTRUCTURE, MODELS, OXYGEN, RADIATION, SURFACES, VACUUM, DAMAGE ASSESSMENT, SINGLE CRYSTALS.

IDENTIFIERS: (U) PE81103D, WJAFOSR3484CS.

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T4I55F

Availability: Pub. in Jnl. of Physical Chemistry, v88 n22 p8898-8904, 1982. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The origin of spontaneously generated chemical waves in an oscillatory Belousov-Zhabotinski reaction has been investigated by numerical calculations of the deterministic reaction-diffusion equations of a modified Oregonator model and by equilibrium stochastic calculations. From numerical calculations, we obtain threshold perturbations in the phase of oscillations and in the concentrations of HBrO₂ and Br⁻ within areas of space with varying radii necessary to initiate trigger waves. Inward propagating trigger waves initiated by a phase shift in the perturbed region with respect to the bulk solution have been observed in the calculations for the first time. Perturbations smaller than the threshold perturbations or in regions with smaller radii lead to phase-diffusion waves. Our equilibrium stochastic calculations show that the recurrence time for a thermal fluctuation to induce a change in the HBrO₂ concentration of sufficient magnitude within a sufficient volume for a trigger wave to propagate is many orders of magnitude larger than the observation time of traveling wave experiments. We concluded that an internal thermal fluctuation is highly unlikely to generate a trigger wave in an oscillatory chemical solution.

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STANFORD UNIV CA DEPT OF CHEMISTRY

DESCRIPTORS: (U) *OSCILLATION, *WAVE PROPAGATION, *CHEMICAL EQUILIBRIUM, DIFFUSION, INTERNAL, MODELS, OBSERVATION, PERTURBATIONS, PHASE SHIFT, REGIONS, TRAVELING WAVES, VOLUME, REPRINTS, STOCHASTIC PROCESSES, RADIUS(MEASURE), THERMAL PROPERTIES, NUMERICAL ANALYSIS, HYDROGEN, BROMINE, OXYGEN, RADIOFREQUENCY.

(U) Multiple Steady States in Coupled Flow Tank Reactors.

MAY 92 16P

PERSONAL AUTHORS: Hunt, Katharine L.; Kottalam, J.; Hatlee, Michael D.; Ross, John

IDENTIFIERS: (U) PE81102F, WUAFOSR230381, Chemical waves, Generation, Kinematic waves, Trigger waves

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0227, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemistry Physics, v98 n9 p7018-7033, 1 May 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Coupling between continuous-flow stirred tank reactors (CSTR's), each having multiple steady states, can produce new steady states with different concentrations of the chemical species in each of the coupled tanks. In this work, we identify a kinetic potential ψ that governs the deterministic time evolution of coupled tank reactors, when the reaction mechanism permits a single-variable description of the states of the individual tanks; examples include the iodate-arsenous acid reaction, a cubic model suggested by Noyes, and two quintic models. Stable steady states correspond to minima of ψ and unstable steady states to maxima or saddle points; marginally stable states typically correspond to saddle-node points. We illustrate the variation in ψ due to changes in the rate constant for external material intake ($K_{sub o}$) and for exchange between tanks ($K_{sub x}$). For fixed ($K_{sub o}$) values, we analyze the changes in numbers and types of steady states as ($K_{sub x}$) increases from zero. We show that steady states disappear by pairwise coalescence; we also show that new steady states may appear with increase ($K_{sub x}$). When the reaction mechanism is sufficiently complex, for fixed initial conditions, the steady state ultimately reached in a mixing experiment may depend on the exchange

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rate constant as a function of time(K sub x) (t):
Adiabatic mixing is obtained in the limit slow changes in
(K sub x)(t) and instantaneous mixing in the limit
remains small

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Slowing Down Near the Critical Point in Optically
Bistable ZnSe.

DESCRIPTORS: (U) *CONCENTRATION(CHEMISTRY), *CHEMICAL
REACTIONS, *ARSONIC ACID, *IODATES, STEADY STATE,
STABILITY, ADIABATIC CONDITIONS, REPRINTS, REACTION
KINETICS, STEADY FLOW.

JAN 92 8P

PERSONAL AUTHORS: Wolff, Anita N.; Ross, J.; Harding,
Robert H.

IDENTIFIERS: (U) PEG1101F, WUAFOSR230381.

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0228, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n3
p1602-1608, 15 Jan 92. Available to DTIC users only. No
copies furnished by NTIS.

ABSTRACT: (U) We measure relaxation rates near the
critical point and the left hysteresis limit of an
optically bistable system, a ZnSe interference filter.
Our ZnSe system has an inhomogeneous geometry where a
long, narrow illuminated region has boundaries at a
temperature near and below that of the lower state. We
determine the critical angle, the angle of incidence of
light at which the hysteresis limits coalesce to form a
critical point, and perturb the system by changing the
input power beyond the critical point. For incidence
angles equal to or slightly greater than the critical
angle, we find that relaxation rates increase
exponentially as the critical point is approached. The
critical exponents for perturbations which increase the
input power beyond the critical point are greater than
those for perturbations which decrease the input power.
In either case the critical exponents increase as the
angle of incidence approaches the critical angle. When
the hysteresis region is large, we find slowing down near
the left hysteresis limit in accordance with our
calculations based on a one-dimensional inhomogeneous
model.

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DESCRIPTORS: (U) *ZINC SELENIDES, *OPTICS, *STABILITY, ANGLE OF INCIDENCE, BOUNDARIES, FILTERS, GEOMETRY, HYSTERESIS, INPUT, INTERFERENCE, LIGHT, MODELS, ONE DIMENSIONAL, PERTURBATIONS, POWER, RATES, REGIONS, RELAXATION, TEMPERATURE, REPRINTS, HOMOGENEITY, CRITICALITY(GENERAL), MAGNETIC FIELDS.

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Stationary Solutions of the Master Equation for Single and Multi-Intermediate Autocatalytic Chemical Systems, JAN 92 12P

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, *Slowing down, *Critical point, Inhomogeneous models, Bistable systems.

PERSONAL AUTHORS: Zheng, Qiang; Ross, John; Hunt, Katharine L.; Hunt, Paul M.

CONTRACT NO. AFOSR-91-0215

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0228, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v86 n1 p830-840, 1 Jan 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The purpose of this article is to test the hypothesized form of (Sub s) (X,Y) globally by comparison with numerical solutions of Eq. (1.13) in the limit of long-time evolution to a stationary distribution. In the numerical studies, the total number of X and Y molecules present is computationally limited because the time required for relaxation to the stationary distribution (Sub s) (X,Y) scales as $e(n)$ with increasing particle number N. In order to isolate the discrepancies between the approximation and the numerical solutions that result from system-size effects, in Sec. II we first investigate numerical solutions of the master equation for systems with a single chemical intermediate X. For these systems, the corresponding approximation to $Ps(X)$ is exact in the limit of large particle number, though it is not exact for the smaller systems studied. Our calculations illustrate the variation of the error with system size, short of the thermodynamic limit. The results provide the benchmarks for later comparisons between the hypothesized approximation and the numerical solutions of the master equation, in cases with two variables.

DESCRIPTORS: (U) *CATALYSIS, *CHEMICAL REACTIONS.

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STATIONARY, REPRINTS, SOLUTIONS(GENERAL), EQUATIONS, NUMERICAL ANALYSIS, PARTICLES, APPROXIMATION(MATHEMATICS), THERMODYNAMICS, STOCHASTIC PROCESSES, STEADY STATE, DISTRIBUTION, CHEMICAL EQUILIBRIUM.

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) A TR ESR Study of the Quenching of Photoexcited Dioxouranium (VI) Salts by Stable Nitroxyl Free Radicals,

IDENTIFIERS: (U) Same product, Auto catalysis, Intermediates, Differential excess work, Species specific affinities, PE81102F, WUAFOSR2303B1

93 17P

PERSONAL AUTHORS: Khudyakov, I. V.; Turro, N. J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0230, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Research on Chemical Intermediates, v19 n1 p15-30, 1993. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) TR ESR spectroscopy was applied to the study of the quenching of excited dioxouranium (VI) (uranyl)nitrate and sulfate by stable nitroxyl radicals of the 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO) family. Photoexcitation of uranyl in solutions of alcohols of moderate viscosity ($\eta = 3-10$ cP) in the presence of TEMPO leads to CIDEP signals of TEMPO due to a radical triplet pair mechanism (RTPM). Polarized nitroxyls were also observed in solutions of polyelectrolyte sodium poly(styrene-sulfonate) NaPSS. In the presence of the nitroxyl with a positively charged trimethylammonium group. Photolysis of uranyl salts in solutions of alcohols leads to the generation of free radicals of alcohols. No CIDEP of these radicals was observed, distinguishing UO₂ (2+) from its organic analog, the triplet benzophenone. The probable reason for the lack of polarization in uranyl photoreduction is the difficult access of free radicals to the U atom of the solvated radical UO₂ + (V); this atom bears the unpaired electron. The role of polyelectrolytes in the enhancement of the quenching of excited states is discussed. Results are in agreement with the statement that photoexcited uranyl has a triplet multiplicity.

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CRYOGENIC TECHNOLOGY INC WALTHAM MA

DESCRIPTORS: (U) *FREE RADICALS, *SULFATES, *URANIUM, *URANYL RADICALS, *ELECTRON SPIN RESONANCE, *NITRATES, ACCESS, ALCOHOLS, ANALOGS, ATOMS, AUGMENTATION, BENZOPHENONES, ELECTRONS, PHOTOCHEMICAL REACTIONS, PHOTOLYSIS, POLARIZATION, POLYELECTROLYTES, QUENCHING, SALTS, SIGNALS, SODIUM, SPECTROSCOPY, STYRENES, SULFONATES, VISCOSITY, REPRINTS, EXCITATION, NITROGEN COMPOUNDS, POLYMERS, ORGANIC COMPOUNDS, PIPERIDINES.

(U) Molecular Hyperpolarizabilities.

FEB 93 17P

PERSONAL AUTHORS: Sekino, Hideo; Bartlett, Rodney J.

CONTRACT NO. AFOSR-89-0207

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR. XC
TR-93-0232, AFOSR

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2, Photoexcitation, *Dioxouranium, *Nitroxyl, TEMPO(2-2-8-8-tetra methyl piperidine-1-oxyl), Triplet pair, Positive charge, Trimethylammonium, CIDEP, Unpaired electron

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n4 p3022-3037, 15 Feb 93. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We report a systematic study of the first and second hyperpolarizabilities of several small molecules at a consistent level of theory and basis sets. Coupled cluster (CC) methods for correlation, analytical high-order time dependent Hartree-Fock (TDHF) theory for dispersion effects, and polarizability-consistent basis sets give agreement to about 10% between the calculated hyperpolarizabilities and the gas phase experiments for the nonpolar molecules, H₂, N₂, CO₂, and C₂H₄, and effectively nonpolar CO. Results for the polar molecules FH, H₂O, NH₃, and H₂S are improved by adding lone-pair basis functions. For H₂O and NH₃, there is good (- 10%) agreement with experiment. However, a - 20% difference between experiment and theory for the FH molecule persists; this difference is discussed in some detail.... Hyperpolarizabilities, Molecules, Wavefunction, Tensor.

DESCRIPTORS: (U) *MOLECULES, *POLARIZATION, CORRELATION, DISPERSIONS, FUNCTIONS, PHASE, TENSORS, THEORY, TIME, REPRINTS, HARTREE FOCK APPROXIMATION, GASES, HYDROGEN, NITROGEN, CARBON DIOXIDE, ETHYLENE, NONLINEAR OPTICS, WATER, AMMONIA, HYDROGEN SULFIDE, COEFFICIENTS, EXPANSION, ENERGY, DIPOLES, ELECTRIC FIELDS, OSCILLATION, QUANTUM CHEMISTRY, FLUORINE, WAVE FUNCTIONS.

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IDENTIFIERS: (U) PE61102F, WUAFOSR230383,
Hyperpolarizabilities, Consistent level, Basis sets,
CC(Coupled Cluster), TDHF(Time Dependent Hartree-Fock),
Nonpolar, ab Initio calculations, MBPT(Many Body
Perturbation Theory), SCF Theory

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Laboratory Investigations of the Cognitive Mechanism
of Suppression.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 91-14 Dec
92,

MAR 93 37P

PERSONAL AUTHORS: Gernsbacher, Morton A.

CONTRACT NO. AFOSR-91-0323

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0253, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our goal in this research was to further understand the cognitive mechanism of suppression. In our previous work (supported by AFOSR-89-0305), we found that less-skilled comprehenders are less efficient in suppressing inappropriate, irrelevant, or should-be-ignored information. For instance, less-skilled comprehenders are less efficient in suppressing the inappropriate meanings of ambiguous words (e.g., the playing card meaning of spade when they read the sentence He dug with the spade). Less-skilled comprehenders are also less efficient in suppressing the incorrect forms of homophones (e.g., the concept of patients when they read the sentence, He had a lot of patience.) Less-skilled comprehenders are less efficient in ignoring pictures while reading superimposed words, and they are less efficient in ignoring superimposed words while looking at pictures. Furthermore, less-skilled comprehenders inefficiency in suppressing irrelevant, inappropriate, or to-be-ignored information is not restricted to the language domain. Rather, less-skilled comprehenders are less efficient in suppressing typical-but-absent members of scenic arrays (e.g., a tractor in an array of objects typically found in a farm scene). We suggest that less-skilled comprehenders have less efficient suppression mechanisms. In the research we conducted while supported

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by AFOSR-91-0323, we discovered that the mechanism of suppression is under comprehenders' strategic control. and we discovered that the left cerebral hemisphere appears to be specialized for suppressing ambiguous words.

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS
(U) Research Studies in Electromagnetically Induced Transparency.

DESCRIPTORS: (U) *COGNITION, *SUPPRESSION,
*COMPREHENSION, ARRAYS, CARDS, CONTROL, HEMISPHERES,
LANGUAGE, PATIENTS, PICTURES, READING, TRACTORS,
LABORATORY TESTS.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 91-14 Oct 92,

APR 93 16P

PERSONAL AUTHORS: Harris, S. E.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7.

CONTRACT NO. F49820-92-J-0086

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0307, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) To make an atom transparent at a given laser frequency, one applies a second laser whose frequency is equal to the difference of an otherwise empty state and the point in frequency space to which a probing laser is tuned. This type of transparency exhibits an essential nonreciprocity where, though absorption and refractive index may be negated, the nonlinear susceptibilities and coefficients for stimulated and spontaneous remain unchanged. We believe that there may be a new regime of nonlinear optics with special properties as resonances are approached.... Electromagnetically Induced Transparency.

DESCRIPTORS: (U) *ATOMS, *X RAY LASERS, *ULTRAVIOLET LASERS, ABSORPTION, FREQUENCY, LASER APPLICATIONS, NONLINEAR OPTICS, RESONANCE, ELECTROMAGNETISM, TUNABLE LASERS, LASERS, OPTICS, REFRACTIVE INDEX, TRANSPARENCIES.

IDENTIFIERS: (U) WUAFOSR2301AS, Electromagnetically Induced transparency.

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ADVANCED FUEL RESEARCH INC EAST HARTFORD CT

Terminal Active Device, Pulsed Laser Ablation-Deposition.

(U) Superconducting Flux Coupled Fast Switching Device
From YBCO Films.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-20 Feb 92,

APR 92 24P

PERSONAL AUTHORS: Fenner, David B.

CONTRACT NO. F49620-91-C-0067

PROJECT NO. 1802

TASK NO. 01

MONITOR: AFOSR, XC
TR-93-0292, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Applications of high-temperature superconducting (HTSC) materials, especially thin-film YBaCuO (123), to microelectronic devices have been limited by materials-related fabrication problems. Magnetic-flux-coupled devices are less limited by these problems but have not been widely explored. The innovation for this program was demonstration of a flux-coupled device that was: (1) simple to fabricate, (2) based on silicon substrates, (3) shows excellent flux-flow dynamics, and (4) can be implemented in switching or amplifying circuits. In Phase I we have demonstrated our potential for developing this device utilizing high critical-current YBCO thin films on yttria-stabilized zirconia (YSZ)-buffered Si substrates. Our devices are designed to take advantage of these new materials opportunities, are within realistic materials and fabrication constraints, and are projected to operate from dc to at least 10 GHz. The flux-flow devices (FFD) we have fabricated, include: externally-activated magnetic switch, superconducting transformer, and flux-flow (transistor-like) switch. The use of Si wafers not only allows high-quality quality films on large (or very thin) and inexpensive substrates, but also many design configurations with great potential for water-scale, hybrid integration with semiconductor electronics. Thin Film Microelectronics, Superconducting Transistor, Three-

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) Diagnostics of Magnetic Substorms Using Satellite Observations of Magnetic Pulsations.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-31 Oct 92.

OCT 92 85P

PERSONAL AUTHORS: Lin, Chin S.

REPORT NO. SWRI-15-2570

CONTRACT NO. F49620-89-C-0008

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0293, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has demonstrated that one class of magnetic pulsations known as stormtime Pc 5 waves is correlated with substorm onsets. Stormtime Pc 5 waves observed by geostationary satellites in the afternoon sector is characterized by oscillations of magnetic field with a period from 2 to 10 minutes, easily detected by magnetometers on communication or weather satellites. The estimated substorm onset times are found to be within 20 minutes of the actual substorm onset times. Geosynchronous satellites in the afternoon sector would detect these low frequency wave events about 2-4 hours after a substorm onset occurring at local midnight. The delay time depends on the propagation velocity, which varies from a few km/s up to 50 km/s. The disturbed region of a stormtime Pc 5 event has a longitudinal extent varying between 30 and 90 degrees. The study shows that stormtime Pc 5 waves have a wave amplitude confined with about 10 deg from the magnetic equator. The propagation velocity is found to increase with wave frequency and with the magnetic field inclination angle. Comparison of the statistical properties of stormtime Pc 5 waves with theoretical calculations of propagation velocity suggests that the propagation velocity of stormtime Pc 5 waves agrees better with the perpendicular

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group velocity of drift mirror mode. The propagation velocity of stormtime Pc 5 waves appears to be mainly determined by wave parallel wavelength, which is in turn determined by the inclination angle or the magnetic field topology. The obtained results about the propagation properties of magnetic pulsations during storm times is important for the satellite operation since it can be used to predict the plasma environment a synchronous satellite might encounter.

DESCRIPTORS: (U) *ARTIFICIAL SATELLITES, *MAGNETIC FIELDS, *MAGNETIC STORMS, AMPLITUDE, ANGLES, DRIFT, FREQUENCY, GROUP VELOCITY, LOW FREQUENCY, MAGNETOMETERS, MIRRORS, OSCILLATION, VELOCITY, EIGENVALUES, WAVE PROPAGATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2311A1, *Geostationary satellites, Pc 5 Waves, Magnetic pulsations.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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SPARTA INC LEXINGTON MA

IDENTIFIERS: (U) WUAFOSR3005A1, SHB(Spectral Hole Burning).

(U) 4D Interconnect Experimental Development.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 91-30 Sep 92.

JUN 93 46P

PERSONAL AUTHORS: Henshaw, Phillip D.; Lis, Steven A.; Chelfetz, Michael G.

REPORT NO. LTR93-003

CONTRACT NO. F49620-91-C-0002

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0289, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the work performed during a two-year program aimed at demonstrating the feasibility of constructing a 4-dimensional neural network based on the unique properties of spectral hole burning (SHB) materials. SHB materials were synthesized and excellent quality holograms were recorded and retrieved. Both wavelength and angle multiplexing were demonstrated with no apparent crosstalk. We assembled a demonstration holographic optical neural network and tested it as a bidirectional associative memory system. The results obtained clearly demonstrate the fundamental ability to fully connect two 2D planes of digital information. Expectations are that this architecture can be extended to capacities of 10(exp 12) interconnects or greater.... Neural network, Optical computing, Holographic storage, Optical interconnect.

DESCRIPTORS: (U) *NEURAL NETS, *OPTICAL PROCESSING, *SYSTEMS ENGINEERING, *COMPUTER NETWORKS, *FOUR DIMENSIONAL, ANGLES, CROSSTALK, DEMONSTRATIONS, HOLOGRAMS, MATERIALS, MULTIPLEXING, QUALITY, COMPUTER AIDED DESIGN, COMPUTATIONS, FEASIBILITY STUDIES, COMPUTER ARCHITECTURE.

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MARTIN MARIETTA LABS BALTIMORE MD

(U) Tensile Study of Single-Crystal Ternary L12
Trialuminide Al68Ti25Mg.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-31 Jan 93.

MAR 93 43P

PERSONAL AUTHORS: Brown, S. A.; Kumar, K. S.

REPORT NO. MML-TR-93-01

CONTRACT NO. F49620-91-C-0099

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0287, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Single crystal Al68Ti25Mg has been produced and tested in compression as well as uniaxial tension. Yield strengths in compression for orientations near 001 and (111) continuously decrease with increasing temperature in a manner similar to other single crystal L1 2 trialuminides, and also to polycrystals of these materials. Slip was determined to occur on the (111) octahedral planes using two-surface analysis. Critical resolved shear stress (CRSS) variation with temperature, calculated for the (111) (101) slip system, overlaps closely for both orientations. Dislocation analysis confirmed the Burgers vectors to be of the type $a/10$ at both 298K and 1073K. A few uniaxial tension tests were conducted near (001) at 1073K; the HIPed specimens contained a small amount of residual porosity and second phases, which resulted in elastic failure even at this high temperature. Efforts to produce additional crystals with even better microstructures for tension testing are underway.

DESCRIPTORS: (U) *SINGLE CRYSTALS, *TENSILE PROPERTIES, *ALUMINUM COMPOUNDS, *TITANIUM, *MANGANESE, *ALUMINIDES, COMPRESSION, DISLOCATIONS, FAILURE, HIGH TEMPERATURE, MATERIALS, OVERLAP, PHASE, POROSITY, RESIDUALS, SURFACE

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ANALYSIS, SURFACES, TEMPERATURE, TENSION, TEST AND EVALUATION, VARIATIONS, YIELD STRENGTH, AXIAL FLOW, SHEAR STRESSES, ELASTIC PROPERTIES, MICROSTRUCTURE, TERNARY COMPOUNDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A1, Uniaxial, Slip, Octahedral planes, CRSS(Critical Resolved Shear Stress), HIP(Hot Isotatic Pressing)...

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Numerical Studies of Low Temperature Gallium Arsenide Buffer Layers and Their Influence on Device Operation.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 92-15 Jan 93,

APR 93 18P

PERSONAL AUTHORS: Grubin, H. L.; Kreskovsky, J. P.

REPORT NO. SRA-R-93-9134-1

CONTRACT NO. F49620-91-C-0023

PROJECT NO. 2305

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0286, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of the program is the development and application of an algorithm for studying charge transport in low temperature gallium arsenide (LT GaAs) buffer layers and the influence of such layers on device operation. During this reporting period the drift and diffusion equations were modified to include the contributions of clusters in one and two dimensions. In addition, the effects of high resistance material on the operation of FETs was begun. Specifically numerical simulations of clusters in LT GaAs were performed in which the electrical characteristics of the clusters were modeled as local trap sites. Simulations were performed for a single cluster in one dimension, two clusters in one dimension, and an array of clusters in two dimensions. The one-dimensional simulations of a single cluster demonstrate the depletion of mobile charge around the cluster and barrier-like electrostatic behavior. Double cluster simulations, also in one dimension, show the effect of overlapping depletion regions. Two-dimensional simulations of arrays of clusters show how the interaction between the clusters results in an insulating material. Finally, a macroscopic model of the LT material is utilized in the simulation of an FET with an LT layer under the gate. The results suggest that such structures

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should have enhanced breakdown characteristics without adversely affecting performance. Interaction with Wright Laboratories and Lincoln Laboratories on organization of an APS-focused session on LTR materials and future directions is also summarized... LT Material, Clusters, GaAs.

DESCRIPTORS: (U) *BUFFERS, *GALLIUM ARSENIDES, *LAYERS, *LOW TEMPERATURE, *MATERIALS, ALGORITHMS, ARRAYS, BARRIERS, DEPLETION, DIFFUSION, DRIFT, ELECTROSTATICS, EQUATIONS, INTERACTIONS, LABORATORIES, MOBILE, MODELS, ONE DIMENSIONAL, OPERATION, RESISTANCE, SIMULATION, SITES, STRUCTURES, TEMPERATURE, TRANSPORT, TRAPS, TWO DIMENSIONAL, FIELD EFFECT TRANSISTORS, COMPOSITE MATERIALS, NUMERICAL ANALYSIS, ELECTRONS, CURRENT DENSITY, HOLES(ELECTRON DEFICIENCIES).

IDENTIFIERS: (U) WUAFOSR2305BS, Device operation, Charge transport, Clusters, LT(Low Temperature).

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4155F

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HARVARD UNIV CAMBRIDGE MA

COLORADO UNIV AT BOULDER DEPT OF ASTROPHYSICAL PLANETARY
AND ATMOSPHERIC SCIEN CES

(U) Research on Collaborative Planning.

(U) U.S. National Weather Experiment STORM-FEST 1992: Wave
and Turbulence in Frontal Zones.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-28 Feb 92.

FEB 92 10P

DESCRIPTIVE NOTE: Annual Interim rept. 1 Jan-1 Dec 92,

PERSONAL AUTHORS: Grosz, Barbara J.

DEC 92 3P

CONTRACT NO. AFOSR-89-0273

PERSONAL AUTHORS: Blumen, William

PROJECT NO. 2304

REPORT NO. 1533138

TASK NO. A7

CONTRACT NO. F48620-92-J-0137

MONITOR: AFOSR, XC

PROJECT NO. 2310

TR-93-0211, AFOSR

TASK NO. CS

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0239, AFOSR

ABSTRACT: (U) This project investigated characteristics of collaborative problem-solving by multiple human agents, determined the properties needed by a computer system to participate in collaborative plan-based activities, and designed formalizations for representing and reasoning about multi-agent actions and collaborative plans. They defined a set of core action relations, designed an action representation language and a representation that provides for incrementally building action representations from partial information, and significantly modified the SharedPlan model of collaborative activity GS90 to provide for a greater variety of action relations and more complex act-types. Copies of technical papers reporting work supported by this project are included with this report. We have also appended to this report descriptions of our work on mutual beliefs, negotiation in collaborative activity, and modelling of intentions all of which have not yet been published. The report itself summarizes our results.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, COMPUTERS, HUMANS, LANGUAGE, MODELS, PROBLEM SOLVING, REASONING, COMPUTERIZED SIMULATION, COMPUTER LOGIC.

IDENTIFIERS: (U) WUAFOFSR2304A7, PE61102F, SHAREDPLAN Computer program.

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ABSTRACT: (U) A high density of surface and upper air observations, including aircraft observations, were accumulated during the STORM-FEST Experiment in the central United States (1 February-13 March 1992). These data are being analyzed to identify significant internal gravity wave and turbulent activity that occur in association with low-level frontal passages. The principal analysis method is local decomposition using wavelets as basis functions. These functions provide information on both scale and translation of coherent events, and are well-suited for frontal analyses. Dissipation of kinetic energy in frontal zones will be determined using data obtained during STORM-FEST. This information will be used in conjunction with theoretical modeling of the frontal scale contraction process that is currently poorly understood. . . . Waves and Turbulence, Frontal dynamics, STORM-FEST Experiment.

DESCRIPTORS: (U) *FRONTS(METEOROLOGY), AIRCRAFT, DECOMPOSITION, DENSITY, DISSIPATION, ENERGY, GRAVITY WAVES, HIGH DENSITY, KINETIC ENERGY, LOW LEVEL, OBSERVATION, SURFACES, TURBULENCE, ATMOSPHERIC MOTION, ATMOSPHERIC DENSITY.

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IDENTIFIERS: (U) PEB1102F, WUAFOSR2310CS, STORM-FEST.

AMERICAN SOCIETY FOR COMPOSITES DAYTON OH

(U) Biotechnology and Composite Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jun 80-31 May 81.

APR 83 43P

PERSONAL AUTHORS: Woolsey, Barbara C.; Narayan, R.;
Schiaivone, R.C.

CONTRACT NO. AFOSR-80-0283

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0249, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Biotechnology, in general terms, is the science and engineering of using living organisms for making useful products such as pharmaceuticals, foods, fuels, chemicals, materials or in waste treatment processes and clinical and chemical analyses. It encompasses the prosaic form of using yeast cells to make bread and alcohol to the more exciting world of using recombinant DNA technology for producing critically important pharmaceuticals such as human insulin. However, the use of biotechnology in composite materials has just recently been recognized as a potential contributor to the aerospace materials and structures industry. Examples of various biotechnology fields of research that may offer potential applications are: biodegradation, biomimetics, biomining, bio-optics/ bioelectronics biosynthesis and bioprocessing. This paper will examine research in the areas of biomimetics, biosynthesis and bioprocessing.

DESCRIPTORS: (U) *BIOTECHNOLOGY, *SYMPOSIA, BIODETERIORATION, BIOSYNTHESIS, BREAD, CHEMICALS, COMPOSITE MATERIALS, FOOD, FUELS, HUMANS, INDUSTRIES, INSULIN, PAPER, STRUCTURES, WASTE TREATMENT, YEASTS, BIOENGINEERING, AEROSPACE SYSTEMS, BEHAVIOR, BIOMEDICINE, CONSTRUCTION MATERIALS, EXOSKELETON, HIP, LONG RANGE(TIME), MANMADE, DEOXYRIBONUCLEIC ACIDS.

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IDENTIFIERS: (U) PEG1102F, WUAFOSR230382, Blubber, Elastin, Collagen chiten, Hip prosthetics, Fiber reinforced composites, Connective tissue, Fats/mechanical properties.

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) Gordon Research Conferences, 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 May 92.

APR 93 81P

PERSONAL AUTHORS: Cruickshank, Alexander

CONTRACT NO. AFOSR-91-0288

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0248, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A series of Air Force-supported Gordon Conferences were held during 1991 on the following topics/ subtopics: Topic-Inorganic Chemistry/Subtopics-Materials and the Solid State; Catalysis; New Chemistry of Polymetallic Complexes; Organometallic Chemistry; New Directions in the Chemistry of Coordination Complexes; Bioinorganic Chemistry; Chemistry of Surfaces; Mechanistic Studies and Ligand Transformations; General Inorganic Chemistry, Topic-High Performance Thermosetting Polymeric Materials/Subtopics-None Specified. Topic-Molten Salts and Liquid Metals/Subtopics-Metal-Molten Salt Solutions; Molten Salts; Dynamic Properties; Electrochemistry; Surface Phenomena; Metal-Nonmetal Transitions; Novel States of Matter; Simulations and Theoretical Interpretations. Topic-Elastomers/Subtopics-Flow, Miscibility, and Diffusion; Toughening Plastics; Synthesis; Networks; Thermoplastic Elastomers; History; Fillers and Vulcanization. Topic-Dynamics of Gas-Surface Interactions/Subtopics-Surface Vibrations; Electronic Transitions; Ultrafast Surface Processes; Dynamics of Adsorption; Surface Diffusion; Liquid Interfaces; Dynamics of Film Growth; Surface Chemical Processes; Special Topics.

DESCRIPTORS: (U) *CATALYSIS, *ELECTROCHEMISTRY, *INORGANIC CHEMISTRY, *MATERIALS, *MOLTEN SALTS, *SURFACES, ADSORPTION, CHEMICALS, DIFFUSION, DYNAMICS,

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ELASTOMERS, ELECTRONICS, FILLERS, FILMS, FLOW, GAS
SURFACE INTERACTIONS, HISTORY, INTERACTIONS, INTERFACES,
LIGANDS, LIQUID METALS, LIQUIDS, METALS, NETWORKS,
NONMETALS, PLASTICS, SALTS, SIMULATION, SOLIDS, SYNTHESIS,
TRANSFORMATIONS, TRANSITIONS, VIBRATION, VULCANIZATION,
SYMPOSIA, POLYMERS, SOLID STATE CHEMISTRY.

CALIFORNIA UNIV BERKELEY DEPT OF CHEMISTRY

(U) Transition State Spectroscopy of Bimolecular Chemical
Reactions,

92 25P

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

PERSONAL AUTHORS: Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XC
TR-93-0233, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Annual Rev. Phys. Chem, v43 p153-
178, 1992. Available to DTIC users only. No copies
furnished by NTIS.

ABSTRACT: (U) One of the fundamental goals of chemical
physics has been to understand the nature of the
potential energy surfaces on which chemical reactions
occur. Much of this interest focuses on the transition
state region: the region of the surface where chemical
bonds are broken and reformed. The microscopic forces at
play in the transition state region often control the
observable properties of a reaction, including the
reaction cross-section and the product angular and energy
distributions. Indeed, the key issue in chemical reaction
dynamics is to deduce the relationship between these
asymptotic properties of a reaction and the detailed
features of the transition state region, such as (in the
case of a direct reaction) the saddle point location,
barrier height, and bend potential near the saddle point.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *BIOLOGY,
*MOLECULES, BARRIERS, CHEMICAL BONDS, CONTROL, CROSS
SECTIONS, DISTRIBUTION, DYNAMICS, HEIGHT, POTENTIAL
ENERGY, SURFACES, TRANSITIONS, REPRINTS, MOLECULAR STATES,
RESONANCE, PHOTODISSOCIATION, COLLISIONS, SPECTROSCOPY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, *Transition
state spectroscopy, Angular, Saddle point location, Bend

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potential, Photodetachment.

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CALIFORNIA UNIV BERKELEY DEPT OF CHEMISTRY

(U) Photoelectron Spectroscopy of CN⁻, NCO⁻, and NCS⁻.

JAN 93 12P

PERSONAL AUTHORS: Bradforth, Stephen E.; Kim, Eun H.;
Arnold, Don W.; Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0234, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n2
p800-810, 15 Jan 93. Available to DTIC users only. No
copies furnished by NTIS.

ABSTRACT: (U) The 266 nm photoelectron spectra of CN⁻,
NCO⁻, and NCS⁻ have been recorded with a pulsed time-of-
flight photoelectron spectrometer. The photoelectron
spectrum of CN⁻ has also been recorded at 213 nm
revealing transitions to the A 2 pi state as well as the
ground X 2 sigma(+) state of the CN radical. The
following adiabatic electron affinities (EAs) are
determined: EA(CN) = 3.882 + or - 0.004 eV, EA(NCO) = 3.809
+ or - 0.005 eV, and EA(NCS) = 3.537 + or - 0.005 eV. The
adiabatic electron affinity of cyanide is in disagreement
with the currently accepted literature value. Our
measurement of the electron affinity of NCS confirms
recent theoretical estimates that dispute the literature
experimental value. By Franck-Condon analysis of the
vibrational progressions observed in each spectrum, the
change in bond lengths between anion and neutral are also
determined. For NCO- this yields R sub zero(C-N) = 1.17 +
or - 0.01 A and R sub zero(C-O) = 1.28 + or - 0.01 A.
and for CN- the equilibrium bond length is found to be R
sub e(C-N) = 1.177 + or - 0.004 a. The gas phase
fundamental for CN- is determined for the first time:
v=2035 + or - 140 /cm.

DESCRIPTORS: (U) *ANIONS, *CYANIDES, *PHOTOELECTRON

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SPECTRA, *CYANATES, *THIOCYANATES, ELECTRONS, LENGTH, MEASUREMENT, NEUTRAL, PHASE, SPECTROMETERS, TRANSITIONS, REPRINTS, CHEMICAL RADICALS, COMPLEX IONS, PULSES, VIBRATION, CHEMICAL BONDS.

CALIFORNIA UNIV BERKELEY DEPT OF CHEMISTRY

(U) Transition-State Spectroscopy via Negative Ion Photodetachment,

IDENTIFIERS: (U) PE81102F, WUAFDSR2303B1, EA(Electron Affinities), Franck Condon analysis, Progression

83 8P

PERSONAL AUTHORS: Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XC
TR-93-0235, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Accounts of Chemical Research, v26 n2 p33-39, 1993. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) One of the most ambitious goals in the field of reaction dynamics is to be able to construct the complete potential energy surface for a chemical reaction. Given such a surface, one can, in principle, calculate all attributes of the reaction, down to the most detailed state-to-state cross section. Thus, in recent years, an array of experimental and theoretical methods has been developed with the goal of extracting chemically accurate potential energy surfaces for reactions. This is a daunting problem; at present, the H + H₂ reaction is the only system for which such a surface is available. However, while the construction of a full potential energy surface is certainly desirable, it seems more reasonable to concentrate on the regions of the surface that play the largest role in determining the dynamics of a chemical reaction. A fundamental concept in physical chemistry is the idea of the transition state of a reaction, a dividing surface between reactants and products. The transition state often acts as a 'bottleneck' in a chemical reaction, with the consequence that many of the measurable properties of a reaction, ranging from differential cross sections to rate constants, are largely determined by the nature of the potential energy surface in the vicinity of the

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transition state.

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

DESCRIPTORS: (U) *TRANSITIONS, *SPECTROSCOPY, CHEMICAL REACTIONS, CONSTANTS, DIFFERENTIAL CROSS SECTIONS, DYNAMICS, PHYSICAL CHEMISTRY, POTENTIAL ENERGY, RATES, RECREATION, SURFACES, ANIONS, GEOMETRY, MOLECULAR STATES, REPRINTS, IONS.

(U) Photodissociation Spectroscopy of the $Mg^+ - CO$ sub 2 Complex and Its Isotopic Analogs.

FEB 93 10P

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Negative Ion Photodetachment, State to State.

PERSONAL AUTHORS: Yeh, C. S.; Willey, K. F.; Robbins, D. L.; Pilgrim, J. S.; Duncan, M. A.

CONTRACT NO. AFOSR-91-0001

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0236, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v93 n3 p1867-1875, 1 Feb 93. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) $Mg(+) - CO_2$ ion-molecule cluster complexes are produced by laser vaporization in a pulsed nozzle cluster source. The vibronic spectroscopy in these complexes is studied with mass-selected photodissociation spectroscopy in a reflectron time-of-flight mass spectrometer. Two excited electronic states are observed: $(2)2\sigma_g(+)$ and 2π . The 2π state has a vibrational progression in the metal- CO_2 stretching mode ($\omega_{Mg(+) - OCO}$ $e' = 381.8$ /cm). The complexes are linear ($Mg(+) - OCO$) and are bound by the charge-quadrupole interaction. The dissociation energy ($D_{sub 0}$) is 14.7 kcal/mol. Corresponding spectra are measured for each of the 24, 25 and 26 isotopes of magnesium. These results are compared to theoretical predictions made by Bauschlicher and coworkers.

DESCRIPTORS: (U) *ISOTOPES, *MAGNESIUM, *PHOTODISSOCIATION, *SPECTROSCOPY, *CARBON DIOXIDE, DISSOCIATION, ELECTRONIC STATES, ENERGY, INTERACTIONS, IONS, LASERS, MASS, MASS SPECTROMETERS, METALS, MOLECULES, NOZZLE CLUSTERS, NOZZLES, PREDICTIONS, SPECTRA, SPECTROMETERS, VAPORIZATION, REPRINTS, CLUSTERING, PULSES, VIBRATION, LIGANDS, COMPLEX IONS.

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LOUISIANA STATE UNIV BATON ROUGE DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, VIBRIONIC,
Reflection, Time of flight, Stretching mode, Charge-
quadrupole.

(U) Multiprocessing Systems: Reliability Modelling and
Analysis Using Multimode Components and Dependent
Failures.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-31 Oct 92.

OCT 92 109P

PERSONAL AUTHORS: Rai, Suresh

CONTRACT NO. AFOSR-91-0025

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0251, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The researchers have established simple
and efficient algorithms for terminal reliability (TR)
and broadcast reliability (BR) evaluation of the shuffle-
exchange network with an extra stage (SENE). In the SENE,
each input is connected to each output by a pair of
complete binary trees such that the input is connected by
a directed edge to each of the roots, and the leaves of
both trees are identical. These very regular paths from
an input to the outputs offer the structure necessary to
solve the TR BR problems efficiently.

DESCRIPTORS: (U) *COMPUTER NETWORKS
*RELIABILITY(ELECTRONICS), *MULTIPROCESSORS, *MULTIMODE,
ALGORITHMS, EDGES, EXCHANGE, INPUT, OUTPUT, PATHS,
TERMINALS, TREES, FAILURE(ELECTRONICS), INFORMATION
EXCHANGE.

IDENTIFIERS: (U) WUAFOSR2304ES.

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CALIFORNIA UNIV DAVIS DEPT OF MATHEMATICS

MASSACHUSETTS INST OF TECH CAMBRIDGE CERAMICS PROCESSING RESEARCH LAB

(U) Parametric and Combinatorial Problems in Constrained Optimization.

(U) Design, Synthesis, and Chemical Processing of Hierarchical Ceramic Structures for Aerospace Applications.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-30 Sep 92.

MAR 93 5P

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-28 Feb 93.

PERSONAL AUTHORS: Wets, Roger D.

MAR 93 218P

CONTRACT NO. AFOSR-91-0050

PERSONAL AUTHORS: Rhine, Wendell E.; Cima, Michael J.; Bowen, H. K.

PROJECT NO. 2304

CONTRACT NO. F49620-89-C-0102

TASK NO. DS

PROJECT NO. 2303

MONITOR: AFOSR, XC
TR-93-0298, AFOSR

TASK NO. A3

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0294, AFOSR

ABSTRACT: (U) The aggregation principle in stochastic optimization was exploited to build an algorithmic, progressive hedging, for solving such problems. Relationships were developed between asymptotic results for statistical estimators and those for the solution of stochastic optimization problems.

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, *COMBINATORIAL ANALYSIS, OPTIMIZATION, PROBLEM SOLVING, ESTIMATES, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304DS.

UNCLASSIFIED REPORT

ABSTRACT: (U) Ceramic materials are beginning to replace conventional materials in high temperature structural applications, but further advances are needed to improve their reliability. To analyze the complex behavior of ceramics, it is useful to consider the structure on four hierarchical levels - namely the molecular-, nano-, micro, and macroscales. Interactions at and between these various levels of structure exert important and often quite specific influences. The research conducted for this effort involved using chemical approaches to synthesize and process ceramic powders to create and control these hierarchical structures in ceramic materials. With the development of chemical approaches for synthesizing and processing ceramics, it is possible to develop synthetic and processing methods to control the molecular and nanostructure of ceramic powders. This report describes our efforts to synthesize submicron SiC, TiB₂, TiC, and TiN powders, and nanocomposites from preceramic polymers. Efforts to synthesize epitaxial LiNbO₃ films from alkoxide precursors are also described. Ceramic processing, Ceramic powders, Ceramic composites, Nanocomposites, SiC, TiB₂, TiC, Cordierite, Al₂O₃, AlN, Synthesis, Metal organic precursors.

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NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

DESCRIPTORS: (U) *CERAMIC MATERIALS, *STRUCTURES, CHEMICALS, CONTROL, FILMS, HIGH TEMPERATURE, INTERACTIONS, METALS, MINERALS, POLYMERS, POWDERS, PRECURSORS, PROCESSING, RELIABILITY, SYNTHESIS, TEMPERATURE, MOLECULAR STRUCTURE, SILICON CARBIDES, TITANIUM BORIDE, CARBIDES, COMPOSITE MATERIALS, EPITAXIAL GROWTH, LITHIUM NIOBATES, OXIDES, NITRIDES, METALS, ORGANIC MATERIALS.

(U) Laboratory Studies of Gravity Wave/Mean Flow Interactions.

DESCRIPTIVE NOTE: Annual rept. 15 Nov 91-14 Nov 92.

MAR 93 32P

IDENTIFIERS: (U) PE61102F, WUAFOFSR2303A3, Nanoscale, Microscale, Macroscale.

PERSONAL AUTHORS: Delisi, Donald P.

REPORT NO. NWRA-CR-92-R095

CONTRACT NO. F49620-92-C-0005

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0265, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reported on laboratory measurements of gravity wave/critical layer interactions. Previous results have been reported for the interactions of single monochromatic waves propagating in a stratified fluid with a vertical velocity shear. The new results presented here are for two monochromatic forcing waves, each propagating with a different phase speed. Thus, the critical layer for each wave is distinct in the vertical. The results for the two-wave case are compared to similar results for the one-wave case. In the one-wave case, only weak overturning appeared in the upper part of the tank for interaction times longer than about 13 minutes, and regular, periodic turbulence was observed in the lower part of the tank. In contrast, in the two-wave case, sustained overturning was observed in the upper part of the tank and packets of turbulence were seen in the lower part of the tank. Velocity profiles are currently being examined to attempt to understand these observed differences. Other improvements in the hardware and software of the facility are also reported, and plans for the coming year are discussed. Gravity wave, Critical layer, Internal wave, Stratification, Shear, Turbulence.

DESCRIPTORS: (U) *GRAVITY WAVES, *FLOW VISUALIZATION,

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*TURBULENT FLOW, INTERACTIONS, INTERNAL WAVES, LAYERS, MEASUREMENT, PACKETS, STRATIFICATION, TURBULENCE, VELOCITY, SHEAR STRESSES, SOFTWARE ENGINEERING, FLUID FLOW, HYDRAULIC MODELS.

OREGON STATE UNIV NEWPORT HATFIELD MARINE SCIENCE CENTER

(U) Parallel Processing and Learning: Variability and Chaos in Self-Organization of Activity in Groups of Neurons.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2310CS.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 92-1 Feb 93.

MAR 93 3P

PERSONAL AUTHORS: Mpitsos, George J.

CONTRACT NO. F49620-92-J-0140

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0238, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Computer simulations of catalytic networks. Andrade et al. (1993) have recently published the results of our first simulations, and have addressed the problem of the effect that catalytic error has in controlling system dynamics. Simulations of large networks are being designed in order to examine spatio-temporal dynamics in reaction-diffusion systems. The aim is to develop visualization and analysis methods to apply large networks composed of biologically realistic neurons. Immunohistochemical studies have examined mammalian tissues that may be useful as model systems to examine distributed function in neurotransmission and neuromodulation (Soinila and Mpitsos, 1992; Soinila et al., 1992). It is necessary, as these and other publications (e.g., Mpitsos and Soinila, 1993) indicate, not only to understand neural organization in a simple animal, but also to examine the applicability of the findings to higher animals, and, if possible, to humans. Molecular biological studies of muscarinic receptors: In previous AFOSR-published work, Murray et al. (1985) and Murray and Mpitsos (1988) showed further that brief pharmacologic blocking of these receptors enhances 1-Trial associative learning. Over the past year, we have developed cloning vectors for generating fusing proteins to all of the five known muscarinic receptor subtypes in humans. Our next

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step is to obtaine immunofluorescent antisera to the fusion proteins in order to visually identify cells containing the different muscarinic receptors. The in-between step will be to determine the specificity of the antisera. The findings will be applicable not only to our experimental animal, but also to studies of learning and pathologies in humans.

DESCRIPTORS: (U) *PARALLEL PROCESSING, *LEARNING, CHAOS, COMPUTERIZED SIMULATION, NETWORKS, MEMORY(PSYCHOLOGY).

IDENTIFIERS: (U) Tina(Time Invariant Noise Algorithm), Muscarinic receptors, Catalytic networks, PE61102F, WJAFOSR231A1

MINNESOTA UNIV MINNEAPOLIS INST FOR MATHEMATICS AND ITS APPLICATIONS

(U) Environmental Studies: Mathematical, Computational and Statistical Analyses.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 92,

MAR 93 34P

PERSONAL AUTHORS: Friedman, Avner; Miller, Willard, Jr

CONTRACT NO. F49620-92-J-0410

PROJECT NO. 2304

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0317, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) As we enter the final decade of the twentieth century, environmental protection has become a universal issue with world-wide support. Destruction of the stratospheric ozone-layer, global increase in carbon dioxide and other radiatively important trace gases, acid rain, urban smog, water pollution of various types, and improper disposal of toxic wastes have all been shown as pressing problems for the 1990's. Environmental studies have now bridged the realms of academic research and societal applications. Mathematical modelling and large-scale data collection and analysis lie at the core of all environmental studies. Examples of such issues are the protection of the ozone-layer, climate change, regional and urban pollution, toxic waste disposal and water pollution. While each of these environmental problems involves extremely complex interplay of many physical, chemical and even human interactions, mathematical analysis serves as the single unifying foundation. Because of the well-recognized highly intensive and perturbing impact of direct environmental experiments, computational models become the prevalent tool in identifying, assessing and resolving these problems. Unfortunately, scientists, mathematicians, and engineers immersed in developing and applying environmental models, computational methods, statistical techniques and

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computational hardware advance with separate and often discordant paces. The Summer Program on Mathematical, Computational and Statistical Analyses in Environmental Studies was designed to provide a much needed interdisciplinary forum for joint exploration of recent advances in the formulation and application of (A) environmental models, (B) environmental data and data assimilation, (C) stochastic modeling and optimization, and (D) Global climate modeling.

ARIZONA UNIV TUCSON

(U) The Chronic Effects of JP-8 Jet Fuel Exposure on the Lungs.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 92-1 Apr 93,

APR 93 12P

DESCRIPTORS: (U) *ENVIRONMENTAL PROTECTION, *STATISTICAL ANALYSIS, *MATHEMATICAL MODELS, ACID DEPOSITION, ACIDS, AEROSOLS, ASSIMILATION, ATMOSPHERICS, CARBON, CARBON DIOXIDE, CHEMICALS, CHEMISTRY, CLIMATE, CLOUD PHYSICS, CLOUDS, CORES, DESTRUCTION, DIOXIDES, DISPOSAL, DYNAMICS, ENGINEERS, EQUATIONS, FLOW, FORMULATIONS, GLOBAL, HUMANS, IDENTIFICATION, IMPACT, INTERACTIONS, INVERSE SCATTERING, KINETICS, LAYERS, MATHEMATICAL ANALYSIS, MEDIA, OPTIMIZATION, OZONE, OZONE LAYER, PARAMETERS, PARTICLES, PHYSICS, POLLUTION, PROTECTION, QUANTITY, RAIN, SCALE, SCATTERING, SCIENTISTS, SMOG, STATISTICS, STOCHASTIC PROCESSES, SUMMER, SYMPOSIA, THEORY, TIME, TIME SERIES ANALYSIS, TOOLS, TRACE GASES, WASTE DISPOSAL, WASTES, WATER, WATER POLLUTION, WORKSHOPS, STATISTICAL SAMPLES.

PERSONAL AUTHORS: Witten, Mark L.

CONTRACT NO. AFOSR-91-0199

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0302, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PE81102F, WUAFOSR23048S.

ABSTRACT: (U) The second year of this project concentrated on using a 'high' dose of JP-8 jet fuel in our exposure regimen. We selected a target dose of approximately 1,000 mg/m³ based on a published epidemiological study conducted at NATO Air Force Bases that demonstrated jet fuel concentrations as high as 1,020 mg/m³ during refueling operations. The rats in the 'high' dose studies were exposed to an average of 813.8 Mg/m³ for one hour/day for 7 and 28 days. In our previous work, a 'low' dose concentration of JP-8 jet fuel (500 mg/m³) for one hour/day for 7 and 28 days did not show any significant changes in lung structures by light microscopy. However, when light microscopy was performed on lung sections from rats exposed to JP-8 jet fuel for 7 and 28 days at the 'high' dose concentration, the evidence for injury to the alveolar-capillary barrier was overwhelming. In these rats, we observed red blood cells in the alveolar air spaces, distortion of the bronchial airways, and loss of epithelial cells in the alveoli. These findings were substantiated by electron microscopy which showed epithelial cells missing their basement membrane, airways devoid of cilia, and alterations of type II alveolar epithelial cells.

DESCRIPTORS: (U) *BLOOD CELLS, *JET ENGINE FUELS,

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*HISTAMINE, *KIDNEYS, *SPLEEN, ALVEOLI, BARRIERS, CILIA, DISTORTION, ELECTRON MICROSCOPY, WOUNDS AND INJURIES, LUNG, MEMBRANES, NATO, RATS, REFUELING, BLOCKING, CHEMICALS, ENZYMES, FUNCTIONS, HYDROCARBONS, IDENTITIES, LIVER, MICE, PERMEABILITY, PULMONARY FUNCTION, SENSITIVITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312AS, *Red Blood cells.

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HARVARD COLL CAMBRIDGE MA

(U) Intermediate Levels of Visual Processing.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92.

SEP 92 4P

PERSONAL AUTHORS: Nakuyama, Ken

CONTRACT NO. F49820-92-J-0018

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0308, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) (1) Developed a theory to explain perceived depth in untextured stereograms which relies on the principles of generic image sampling. (2) Conducted experiments on visual search and visual texture segregation which show that early filter outputs are not accessible to either of these two operations. (3) Discovered a new form of implicit memory which is uniquely shortlasting (approx 30 seconds) and which assists in enabling more speedy popout with repeated trials. (4) Developed a new theory of binocular vision which relies heavily on the importance identification of half-occlusions.

DESCRIPTORS: (U) *DEPTH, *IMAGES, *VISUAL PERCEPTION, FILTERS, IDENTIFICATION, OUTPUT, SAMPLING, TEXTURE, THEORY, VISION, PHOTOGRAPHIC TEXTURE, MEMORY(PSYCHOLOGY), STEREOSCOPIC DISPLAY SYSTEMS, EYE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313AS, Binocular vision.

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CORNELL UNIV ITHACA NY

(U) Geochemical, Genetic, and Physiological Control of Pollutant Biodegradation.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 81-28 Sep 82.

NOV 82 12P

PERSONAL AUTHORS: Madsen, Eugene L.; Lion, Leonard W.

CONTRACT NO. AFOSR-81-0438

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0303, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposed research was designed to utilize a combination of laboratory and field studies to identify physical, chemical, genetic, and physiological influences that govern the accumulation and biodegradation of polycyclic aromatic hydrocarbons (PAHs). These and related compounds are among the chemicals whose environmental fate has been targeted by the U.S. Air Force Bioenvironmental Research Program. We have conducted a prior, independent study that has shown that, despite the presence of PAH mineralizing microorganisms, PAHs persist at a site where freshwater sediments are fed by PAH-contaminated ground water. Hypotheses to be tested address fundamental mechanisms for the persistence of environmental pollutants, these include: (1) the rate of delivery meets or exceeds the rate of biodegradation; (2) the PAHs are not available to microbial populations due to sorption onto the sediment organic matter, complexation reactions with dissolved organic carbon, or due to the physical arrangement of the sediment matrix which prevents contact between PAHs and microorganisms; (3) the microorganisms may be physiologically limited by the presence of preferred metabolic substrates or toxic or inhibitory substances, or by the lack of proper final electron acceptors, electron donors, or inorganic or organic nutrients; and (4) PAHs may persist simply due to restricted distribution and abundance of biodegradation

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genes in naturally occurring microbial populations. By working in an iterative manner between field observations and controlled laboratory determinations, we intend to systematically test the above hypotheses and thus identify constraints on microbiological processes that mineralize PAHs (naphthalene and phenanthrene) at the field site.

DESCRIPTORS: (U) *MICROORGANISMS, *AROMATIC HYDROCARBONS, *BIODETERIORATION, *ACCUMULATION, POLLUTANTS, PHENANTHRENES, GEOCHEMISTRY, CONTAMINANTS, PHYSIOLOGY, NAPHTHALENES.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2312A4, Biodegradation, Environmental fate, Polycyclic aromatic hydrocarbons.

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MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

shorter wavelengths.

(U) Microwave Emission From Relativistic Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89.

APR 83 188P

PERSONAL AUTHORS: Bekefi, George

CONTRACT NO. AFOSR-89-0082C

PROJECT NO. 2301

TASK NO. ES

MONITOR: AFOSR, XC
TR-83-0309, AFOSR

IDENTIFIERS: (U) Wigglers

DESCRIPTORS: (U) *ELECTRON BEAMS, *ELECTRON ACCELERATORS, *MICROWAVES, *FREE ELECTRON LASERS, *ELECTRON GUNS, *LASER AMPLIFIERS, *OPTICAL WAVEGUIDES, RESONANCE, THERMIONIC EMISSION, CYCLOTRONS, ELECTRON EMISSION, MASERS, ELECTROMAGNETIC RADIATION, PARTICLE ACCELERATORS, RADIANT INTENSITY, MAGNETIC FIELDS, COHERENT RADIATION, MAGNET COILS, SOLENOIDS, AIR FORCE RESEARCH.

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a continuation proposal on Microwave Emission from Relativistic electron Beams. Below we summarize the various research activities. All of the experimental studies described below will be performed using our Physics International 815MR Pulsed Accelerator with a maximum voltage of 500 kV and peak currents of 4 kA and the 1.5MV, 30kA Pulsed 110A. The electron beam is presently generated by a thermionically emitting, electrostatically focused, Pierce-type electron gun (250 kV, 250 A) removed from a SLAC klystron. An assembly of six focusing coils is designed so that their magnetic field lines lie along the zero-magnetic field electron trajectories. This field configuration gives the least scalloping of the electron beam (low transverse temperature) and allows the magnetic field amplitude to be varied over a wide range without greatly affecting the electron beam temperature. Only the inner portion of the beam is used; an aperture limits the beam radius to $r \leq b = 0.254$ cm. Consequently, the net current available for the different experiments is in the range of 1-8 A. In addition to the above gun, we have recently procured from SLAC a brand-new, state of the art, electron gun that can operate at 450 kV and a peak current of approximately 500 A. The advantage of this system over the previous one is our ability to operate at higher voltages and thus study the various coherent radiation mechanisms at considerably

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CORNELL UNIV ITHACA NY DEPT OF ELECTRICAL ENGINEERING

DESCRIPTORS: (U) *TARGET DETECTION, ARRAYS, COVARIANCE, CROSS SECTIONS, DETECTION, DETECTORS, INVARIANCE, TARGETS, TEST AND EVALUATION, GAUSSIAN NOISE, ADAPTIVE FILTERS, MATCHED FILTERS, ADAPTIVE SYSTEMS, SIGNAL PROCESSING, CONVERGENCE.

(U) Enhanced Convergence Adaptive Detection.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Nov 81.

FEB 93 8P

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A8.

PERSONAL AUTHORS: Steinhart, Allan O.

CONTRACT NO. AFOSR-91-0149

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, XC
TR-93-0313, AFOSI.

UNCLASSIFIED REPORT

ABSTRACT: (U) We addressed the problem of detecting targets using an array of active sensors. We have been concerned with devising means of obtaining reliable detection with a small number of samples (small relative to the number of unknown parameters). This problem arises with large arrays, and/or low cross section targets. Past techniques for addressing this problem incorporated prior structure into likelihood procedures. Such approaches are (1) intractable, requiring iterative solution, (2) not CFAR, and (3) not optimal. We have approached this problem using group symmetries. Specifically, we introduce a framework for exploring array detection problems in a reduced dimensional space by exploiting the theory of invariance in hypothesis testing. This involves calculating a low dimensional basis set of functions called the maximal invariant, the statistics of which are often tractable to obtain, thereby making analysis feasible and facilitating the search for tests with some optimality property. Using this approach, we obtain a locally most powerful test for the unstructured covariance case and show that the Kelly and AMF detectors form an algebraic span for any invariant detector. Applying the same framework to structured covariance matrices, we gain some insights and propose several new detectors which are shown to outperform existing detectors.

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TEXAS A AND M UNIV COLLEGE STATION DEPT OF BIOLOGY

(U) Melatonin, The Pineal Gland and Circadian Rhythms.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 92-30 Apr 93,

APR 92 22P

PERSONAL AUTHORS: Cassone, Vincent M.

CONTRACT NO. AFOSR-90-0244

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0306, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Amniote circadian organization derives from the interaction circadian oscillator and photoreceptors located in the hypothalamic suprachiasmatic nuclei (SCN), the pineal gland and the eyes. In mammals, circadian organization is dominated by the SCN which serve as 'master pacemakers' in the control of a wide array of behavioral and physiological rhythms including locomotion, sleep/wake, thermoregulation, cardiovascular function and many endocrine processes. Among the rhythms under SCN control in mammals is the circadian synthesis and secretion of the pineal hormone melatonin which relies on a multi-synaptic pathway via the sympathetic nervous system to maintain and entrain rhythmicity in this hormone. Several studies have indicated that pineal melatonin feeds back on SCN rhythmicity to modulate circadian patterns of activity and other processes. However, the nature and system-level significance of this feed-back is unknown. Recently published work indicates that while pinealectomy does not affect rat circadian rhythms in LD or DD, wheel-running activity rhythms are severely disrupted in LL. These data suggest that either (1) pineal feed back regulates the light sensitivity of the SCN and/or (2) it affects coupling among circadian oscillators within the SCN or between the SCN and its output. Research in our laboratory is currently addressing each of these hypotheses.

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DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *HORMONES, *PINEAL GLAND, *SENSITIVITY, CONTROL, COUPLINGS, EYE, FUNCTIONS, HYPOTHESES, INTERACTIONS, LIGHT, LOCOMOTION, MAMMALS, MELATONIN, NUCLEI, OSCILLATORS, OUTPUT, PATTERNS, PHOTORECEPTORS, RATS, SECRETION, SLEEP, SYMPATHETIC NERVOUS SYSTEM, SYNTHESIS, TEMPERATURE CONTROL, PHASE, TEST AND EVALUATION, PHASE STUDIES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2312CS, Melatonin sensitivity

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SEARCH CONTROL NO. T4155F

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GUMBS ASSOCIATES INC EAST BRUNSWICK NJ

FLORIDA UNIV GAINESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Ultrafast, Passive, Broad-Band, Optical Shutter Based
on Novel Semiconductor/Conducting Polymer Interfaces.

(U) Location and Characterization of In-Cloud Lightning
Currents by Multiple Station VHF and Electric Fields
Measurements.

DESCRIPTIVE NOTE: Final rept. 15 Jan-15 Dec 92.

DESCRIPTIVE NOTE: Annual rept..

DEC 92

8P

DEC 92 6P

PERSONAL AUTHORS: Chandrasekhar, P.

PERSONAL AUTHORS: Thomson, Even M.

CONTRACT NO. F49820-92-C-0040

CONTRACT NO. AFOSR-91-0083

PROJECT NO. 1602

PROJECT NO. 2310

TASK NO. 01

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0301, AFOSRMONITOR: AFOSR, XC
TR-93-0305, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The project sought to implement a new technology for a novel solid state optical shutter obtained from interfacing inorganic semiconductors to conducting polymers, which then switch on activation by a high intensity radiation source in the ultrafast regime. Se/P(DPA) interfaces were prepared and yielded switching efficiencies at 532 nm, calculated as Delta OD= OD(laser)-OD(rest), of between 0.3 and 0.8 at pulse energies as low as 0.1-1.0 mJ/pulse (7 mm beam). Tests with CdSe, AlSb yielded similar Delta OD values. Tests with single crystal CdSe did not yield promising results. The conclusion appears to be that much additional work is needed, especially on a scientific level probing the physical aspects of the phenomenon, before practical devices can become feasible.

DESCRIPTORS: (U) *OPTICAL SWITCHING, *SOLID STATE ELECTRONICS, *ELECTROOPTICS, ACTIVATION, CRYSTALS, HIGH INTENSITY, INTERFACES, LASERS, POLYMERS, RADIATION, SEMICONDUCTORS, SINGLE CRYSTALS, TEST AND EVALUATION, INORGANIC MATERIALS, CADMIUM SELENIDES, CHEMICAL PROPERTIES, CHARGE TRANSFER, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE63218C, WUAFOSR160201, Optical shutter, Antimonide/aluminum.

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ABSTRACT: (U) The network established in 1991 to measure electric fields in a 800 Hz to 3.5 MHz 3dB bandwidth at five stations at Kennedy Space Center was enhanced in 1992. New microprocessor-controlled remote controls were developed, additional remote calibration signals were added, and new sensor amplifiers were implemented so that we could record the derivative of the electric field, dE/dt. These improvements enabled us to increase our bandwidth from 3.5 MHz to 7 MHz and to record sharper signals (dE/dt) that allow better location accuracy. During the week of August 17-25 several days worth of storms formed over our network and provided excellent data on close lightning. Meteorological data were also obtained for these storms.

DESCRIPTORS: (U) *ELECTRIC FIELDS, *LIGHTNING, *CLOUD PHYSICS, ACCURACY, AMPLIFIERS, BANDWIDTH, CALIBRATION, METEOROLOGICAL DATA, MICROPROCESSORS, REMOTE CONTROL, SIGNALS, STORMS, VERY HIGH FREQUENCY, WEATHER STATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310CS.

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AD-A284 096 CONTINUED

TEXAS UNIV HEALTH SCIENCE CENTER AT SAN ANTONIO

Melanin, Ascorbic acid, Linoleic acid.

(U) Investigation of Laser-Induced Retinal Damage.

DESCRIPTORS: (U) *OXIDATION REDUCTION REACTIONS, *LASER DAMAGE, ASCORBIC ACID, CELLS(BIOLOGY), FREE RADICALS, ILLUMINATION, KINETICS, LIGHT, LINOLEIC ACID, LIPIDS, MELANIN, MODELS, PHOTONS, PIGMENTS, THERMAL STRESSES, PHOTORECEPTORS, PHOTOCHEMICAL REACTIONS, EYE.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 92-31 Mar 93,

APR 93 11P

PERSONAL AUTHORS: Glickman, Randolph D.; Lam, Kwok-Wai

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A5, *Retinal damage, HPCE(High Performance Capillary Electrophoresis), Photooxidation

REPORT NO. UTHSCSA-OPH-93-01

CONTRACT NO. AFOSR-91-0208

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0304, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser-induced damage in ocular tissue was studied with biochemical measures designed to characterize cellular damage mechanisms. Photochemical damage was identified by evidence of oxidative reactions resulting from photosensitizers and free radicals activated by the light exposure. Melanin, in the retinal pigment epithelial (RPE) cells, during illumination formed a free radical that rapidly oxidized ascorbic acid (AA). This specific reaction may safely direct excess photons into a chain of coupled redox reactions. RPE cells have a high capacity for utilizing AA; the cells have different transporters for AA and its oxidized form, dehydro-L-ascorbic acid (DHA), and are able to reduce DHA to AA. The kinetics of these transporters were measured in these studies. Light-activated melanin was also shown to react with linoleic acid, a model lipid. Thus, in the absence of sufficient AA, the melanin radical may initiate lipid peroxidation, a known concomitant of photochemical damage. Development of assays indicative of thermal damage was also started. Initial results suggested that extracellular potassium ion concentration increased following laser-induced thermal stress in RPE cells. This change was hypothesized to result from damage to sodium-potassium ionic pumps in the cell's plasma membrane.... Laser bioeffects, Photochemical, Thermal, Photooxidation,

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NEW YORK UNIV MEDICAL CENTER NY

(U) Computing with Neural Maps: Application to Perceptual and Cognitive Function.

proceedings of an earlier conference which introduced the term 'Computational Neuroscience' into its current widespread use.... Visual cortex, Vision, Pattern recognition, Active vision.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 92.

DESCRIPTORS: (U) *PATTERN RECOGNITION, *CONFORMAL MAPPING, *TOPOGRAPHIC MAPS, *COMPUTER VISION,

MAR 93 5P

CLASSIFICATION, CONTROL, IMAGE PROCESSING, IMAGES,

PERSONAL AUTHORS: Schwartz, Eric L.

MAGNIFICATION, MODELS, MAPS, MOTORS, PATTERNS, PROTOTYPES, SCALE, TWO DIMENSIONAL, VALUE, VISION, VISUAL CORTEX, COMPUTATIONS, VISUAL PERCEPTION, MATHEMATICAL MODELS, COGNITION.

CONTRACT NO. AFOSR-88-0275

PROJECT NO. 2313, 2305

IDENTIFIERS: (U) PE81102F, WUAFOSR2313A8, WUAFOSR2305B3, *Neural maps.

TASK NO. A8, B3

MONITOR: AFOSR, XC
TR-93-0315, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this report, a series of studies concerning the use of neuronal map data structures for the solution of perceptual, attentional and pattern classification problems have been developed. Models for visual attention, based on the representation of an attentional space as a two dimensional map have led to a model of visual attention which has been successfully used in the application of a space-variant active vision system, described below. It has been demonstrated that stereo fusion limits, such as Panum's fusional area, scale in a manner which is determined by the size of a cortical hypercolumn, and the local value of cortical magnification factor, supporting a model in which stereo disparity is computed by a local correlational operator defined on the span of a single pair of ocular dominance columns. Methods for numerically modeling conformal topographic cortical maps have led to important insights into the pattern level description of these cortical systems. A prototype space-variant active vision system has been constructed, with funds for hardware support from DARPA, and a number of difficult algorithmic problems in motor control, attention, space-variant image processing, and space-variant pattern classification, have begun to be studied. One book has been published in this project period: Computational Neuroscience, Eric Schwartz, MIT Press (1990) which presented the

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NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV
GREENSBORO

IDENTIFIERS: (U) WUAFDSR2305B1, PEB1102F.

(U) Applications of Error Correcting Codes in Fault-Tolerant Logic-Design for VLSI Circuits.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-14 Aug 92,

AUG 92 88P

PERSONAL AUTHORS: Lala, P. K.; Martin, H. L.

CONTRACT NO. F49620-89-C-0089

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR, XC
TR-93-0300, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The use of error detecting/correcting codes in self-checking and fault-tolerant logic design has been receiving considerable attention in recent years. In this report we present the results of our investigation in the application of such codes. We have developed a technique based on low-cost residue code to design arbitrary combinational logic circuits with self-checking capability. We also proposed a technique which allows detection of single, and up to three bits of multi-bit errors in multi-output combinational logic circuits; the major advantage of this technique is that the error detecting capability depends on the output bits of a circuit rather than its internal complexity. A technique for implementing fully testable sequential circuits from their specifications has also been proposed. This technique eliminates the post-design circuit modifications as used in the currently popular scan-based techniques.

DESCRIPTORS: (U) *LOGIC CIRCUITS, *DESIGN CRITERIA, *ERROR CORRECTION CODES, ATTENTION, CIRCUITS, COSTS, DETECTION, ERRORS, FAULTS, INTERNAL, LOGIC, LOW COSTS, MODIFICATION, OUTPUT, RESIDUES, SPECIFICATIONS, FAULT TOLERANCE, VERY LARGE SCALE INTEGRATION.

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SEARCH CONTROL NO. T4155F

AD-A284 062

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MARYLAND UNIV BALTIMORE

(U) Some Statistical Inference Problems in Linear Models and Variance Components Models and Their Applications.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Dec 92.

MAR 93 5P

PERSONAL AUTHORS: Mathew, Thomas

CONTRACT NO. AFOSR-88-0237

PROJECT NO. 2304

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0312, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposal dealt with several statistical inference problems in the context of univariate and multivariate linear models having effects, i.e., fixed effects as well as random effects. Most of the articles that were completed under the grant are on the following topics: (1) Improved nonnegative estimation of variance components. (2) exact and/or optimum tests for the fixed effects. and (3) exact and/or optimum tests for variance components. The results have the potential for applications in all areas where the mixed model methodology is used and the applications are highlighted in in most of the articles that were written based on the problems in the proposal.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *MATHEMATICAL MODELS, GRANTS, METHODOLOGY, MODELS, TEST AND EVALUATION, MATHEMATICAL ANALYSIS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304ES, Univariate analysis, *Linear Analysis.

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UNCLASSIFIED

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WAYNE STATE UNIV DETROIT MI

(U) Bioenvironmental Hazards and DNA Repair.

DESCRIPTIVE NOTE: Final rept. 15 Jun 90-31 Aug 92.

APR 93 12P

PERSONAL AUTHORS: Smith, P. D.

CONTRACT NO. AFOSR-90-0289

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0310, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Information is needed on mechanisms by which humans respond to exposure of their cellular genes to toxic chemicals in the environment. The principal DNA repair mechanism in organisms is excision repair and evidence has accumulated that these mechanisms are highly conserved. Using the fruit fly as a eukaryotic model, we undertook the molecular cloning of excision repair genes on the basis of their potential structural and functional similarity to the well-characterized excision repair genes in yeast. cDNA libraries were constructed from mRNA isolated from Drosophila embryos in a yeast expression vector, pYES 2.0, and subsequently used to rescue a yeast rad3 mutant strain, known to be defective in excision repair. Although the equivalent of four genome equivalents were screened for complementation, no functional cognate Drosophila gene was recovered. On the basis of conserved DNA sequence between the yeast RAD3 and the human ERCC-2 genes, the polymerase chain reaction was used to recover a Drosophila cognate sequence. Using our cDNA library as template, a single NA band was identified. We interpret this to mean that Drosophila does have a RAD3 cognate but it was not represented in a functional form in our cDNA library to allow rescue of the rad3 mutant strain.

DESCRIPTORS: (U) *TOXICOLOGY, *DEOXYRIBONUCLEIC ACIDS, CHAIN REACTIONS, CHEMICALS, DROSOPHILA, EMBRYOS,

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DTIC REPORT BIBLIOGRAPHY

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AD-A264 061 CONTINUED

AD-A264 060 9/1 20/14

ENVIRONMENTS, EXCISION, GENES, HUMANS, HAZARDOUS
MATERIALS, REPAIR, SEQUENCES, TEMPLATES, YEASTS.

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL
ENGINEERING

IDENTIFIERS: (1) PE61102F, WUAFOSR2312A5,
Bioenvironmental hazards.

(U) Improved Design Concepts for Millimeter Wave Power
Sources.

DESCRIPTIVE NOTE: Final rept. 15 Mar 92-14 Mar 93,

MAR 93 23P

PERSONAL AUTHORS: Granatstein, V. L.; Guo, H.; Carmel, Y.

CONTRACT NO. AFOSR-80-0142

PROJECT NO. 2301

TASK NO. ES

MONITOR: AFOSR, XC
TR-83-0311, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This progress report summarizes the work done on 'Improved Design Concepts for Millimeter Wave Power Sources,' covering the period from March 15, 1992 to March 14, 1993. In the past year, we have designed a phase-locked, harmonic, inverted gyro-twistron, known as the phigtron. The phigtron combines a subharmonic gyro-TWT amplifier input section with a gyroklystron type output cavity. The phigtron is expected to reach much higher phase-locking gain and wider bandwidth than the two cavity phase-locked gyroklystron oscillator. The efficient and stable operation of this phase-locked harmonic gyrotron will be obtained through the implementation of mode selective interaction circuits. The proof-of-principle cold test results of such circuitry have recently been obtained indicating that the technical realization of this research concept is feasible. The construction of the phigtron hot test laboratory facility is now actively proceeding.

DESCRIPTORS: (U) *GYROTRONS, *MILLIMETER WAVES, AMPLIFIERS, BANDWIDTH, CAVITIES, CIRCUITS, GAIN, HARMONICS, INTERACTIONS, OSCILLATORS, POWER, TEST AND EVALUATION, DESIGN CRITERIA, KLYSTRONS, SECOND HARMONIC GENERATION, ELECTRON BEAMS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A264 056 12/9

IDENTIFIERS: (U) Phigtron.

NEW YORK UNIV MEDICAL CENTER NY

(U) Computing With Neural Maps: Application to Perceptual and Cognitive Function.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 80-30 Jul 91.

MAR 93 4P

PERSONAL AUTHORS: Schwartz, Eric L.

CONTRACT NO. AFOSR-88-0275

PROJECT NO. 2313, 2305

TASK NO. A8, B3

MONITOR: AFOSR, XC
TR-93-0314, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Models for visual attention, based on the representation of an attentional space as a two dimensional map have led to a model of visual attention which has been successfully used in the application of a space-variant active vision system, described below. Also, it has been demonstrated that stereo fusion limits, such as Panum's fusional area, scale in a manner which is determined by the size of a cortical hypercolumn, and the local value of cortical magnification factor. This in turn supports the notion that stereo disparity is computed by a local correlational operator defined on the span of a single pair of ocular dominance columns. A generalized image warp technique has been developed, which we term the 'protocol column algorithm', which provides image level models of the mapping of ocular dominance and orientation column systems at the level of primary visual cortex. Finally, many of the ideas developed in this project have reached fruition in the construction of a space-variant active vision system. An initial prototype system has been constructed under hardware support from DARPA, and a number of difficult algorithmic problems in motor control, attention, space-variant image processing, and space-variant pattern classification, have begun to be studied. Visual cortex, Vision, Pattern recognition, Active vision.

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SEARCH CONTROL NO. T4155F

AD-A264 056 CONTINUED

AD-A264 015 12/3

DESCRIPTORS: (U) *PATTERN RECOGNITION, *VISUAL PERCEPTION, AIR, ATTENTION, CLASSIFICATION, CONSTRUCTION, CONTROL, IMAGE PROCESSING, IMAGES, MAGNIFICATION, MAPPING, MAPS, MODELS, MOTORS, NUMBERS, PATTERNS, PROCESSING, PROTOTYPES, RECOGNITION, SCALE, TWO DIMENSIONAL, VALUE, VISION, VISUAL CORTEX, COGNITION.

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Easy-to-Apply Results for Establishing Convergence of Markov Chains in Bayesian Analysis.

DESCRIPTIVE NOTE: Technical rept.,

IDENTIFIERS: (U) *Neural Maps, PE61102F.

FEB 93 9P

PERSONAL AUTHORS: Athreya, Krishna B.; Doss, Hanl; Sethuraman, Jayaram

REPORT NO. FSU-TR-884

CONTRACT NO. DAAL03-90-G-0103, AFOSR-90-0202

MONITOR: ARO, AFOSR, XA
27868.26-MA, TR-10, ARO

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Iowa State University, Department of Statistics, Ames, Iowa. Sponsored in part by grant NSF-DMS92-04938.

ABSTRACT: (U) The Markov chain simulation method has become a powerful computational method in Bayesian analysis. The success of this method depends on the convergence of the Markov chain to its stationary distribution. We give two carefully stated theorems, whose conditions are easy to verify, that establish this convergence. We give versions of our conditions which are simpler to verify for the Markov chains that arise most commonly in Bayesian analysis.... Bayesian Poisson regression; Calculation of posterior distributions; Ergodic theorem; Markov chain simulation method.

DESCRIPTORS: (U) *CHAINS, *CONVERGENCE, *MARKOV PROCESSES, DISTRIBUTION, PROBABILITY, SIMULATION, STATIONARY, THEOREMS.

IDENTIFIERS: (U) *Markov chains.

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COMPOSITE MATERIALS, CRYSTALS, SILICON, EPITAXIAL GROWTH, MOLECULAR BEAMS, INDIUM PHOSPHIDES, WAFERS, SPECTROSCOPY, ELECTRON PARAMAGNETIC RESONANCE, QUANTUM WELLS, PHOTODIODES, FIELD EFFECT TRANSISTORS.

IDENTIFIERS: (U) Optoelectronic devices.

AD-A263 607 9/1 9/5 11/4 20/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 4-6 December 1991. Low Temperature (LT) GaAs and Related Materials. Volume 241.

DESCRIPTIVE NOTE: Final rept. 15 Sep 91-14 Sep 92,

SEP 92 311P

PERSONAL AUTHORS: Witt, Gerald L.; Calawa, Robert; Mishra, Umesh; Weber, Eicke

CONTRACT NO. AFOSR-91-0399

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XC
TR-93-0181, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 240, AD-A262 531.

ABSTRACT: (U) The response to this symposium, less than two years later, accurately reflects the increasing awareness of the rich combination of fundamental materials science and electronic optoelectronic applications that are at play in the subject. The gradual and incomplete understanding of the basic mechanisms responsible for the remarkable properties of these materials have produced a confusion of names. At the time of planning for this symposium the organizers attempted to select a suitable name, one reflecting the understanding to date. However, events would have it otherwise. The then common phrase low temperature of LT GaAs was adopted reluctantly. In doing so, it was realized that this phrase is misleading and inaccurate. More appropriate are two other phrases used in these proceedings. GaAs with arsenic precipitates or GaAsAs and low temperature grown or LTG GaAs. This issue of terminology remains to be resolved.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *SEMICONDUCTORS, SYMPOSIA, LOW TEMPERATURE, ARSENIC, OPTICS, ELECTRONICS,

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MATERIALS RESEARCH SOCIETY PITTSBURGH PA

WJAFOSR2308B1, PE81102F.

(U) Wide Band-Gap Semiconductors. 1991 Materials Research Society Symposium Proceedings.

DESCRIPTIVE NOTE: Final rept. 15 Sep 91-14 Sep 92,

SEP 92 810P

PERSONAL AUTHORS: Ballance, John

CONTRACT NO. AFOSR-91-0411

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0180, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Topics include: Theoretical studies of diamond surface chemistry and diamond-metal interfaces; Growth technique for large area mosaic diamond films; Chemical vapor deposition of diamond films using water; alcohol; organic-acid solutions; Remote ECR plasma deposition of diamond thin films from water-methanol mixtures; Deposition of flame grown diamond films in a controlled atmosphere; Sequential growth of high quality diamond films from hydrocarbon and hydrogen gases; Diamond growth from sputtered atomic carbon and hydrogen gas; The CVD diamond nucleation mechanism on Si overlaid with sp² carbon; and investigation into the use of a diffusion barrier in microwave plasma assisted chemical vapor deposition of diamond on iron based substrates; Selective nucleation of diamond crystals on the apex of silicon pyramids; and Effect of laser irradiation on carbon-implanted copper substrates.

DESCRIPTORS: (U) *SEMICONDUCTORS, *DIAMONDS, SYMPOSIA, GROWTH SUBSTANCES, SURFACE CHEMISTRY, THIN FILMS, SILICON CARBIDES, NUCLEATION, CRYSTALS, ELECTRONS, ATOMIC PROPERTIES, CATHODOLUMINESCENCE, COMPOSITE MATERIALS, ZINC SELENIDES, TANTALUM, CARBON, NITRIDES, BORON NITRIDES, OXIDES, HALIDES, ALLOYS.

IDENTIFIERS: (U) *Wide band gap, Chalcopyrites,

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CAMBRIDGE HYDRODYNAMICS INC PRINCETON NJ

(U) Development of a New Technique for Image Reconstruction, Enhancement, and Visualization.

DESCRIPTIVE NOTE: Final rept. 15 Apr 90-14 Oct 92.

FEB 93

88P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-90-C-0028

MONITOR: AFOSR, XC
TR-93-0255, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The problem of describing and reconstructing a surface, both analytically and visually been extensively addressed in this work. Various algorithms have been developed, tested, and compared and several conclusions have been reached. They are: (1) if the surface information is given on a uniform grid, the surface is best described by a set of contour plotting routines that exploit the GL graphics libraries both in a solid as well as a wire-mesh framework; (2) if the surface information is given on a non-uniform grid, the surface can be described by Delaunay triangulation, a sophisticated graphics computer, or by interpolation back to a uniform grid. Numerous examples are given which show the advantages of these methods for specific applications. ... Triangulation, Image reconstruction, Image enhancement, Edge enhancement, Surface mapping, Delaunay triangulation.

DESCRIPTORS: (U) *ALGORITHMS, *SURFACE ANALYSIS, *IMAGE INTENSIFICATION, AUGMENTATION, COMPUTERS, CONTOURS, EDGES, GRIDS, IMAGES, INTERPOLATION, LIBRARIES, MAPPING, MESH, PLOTTING, SOLIDS, SURFACES, TRIANGULATION, WIRE, COMPUTER GRAPHICS.

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20/4

21/5

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Flow Phenomena in Turbomachines.

DESCRIPTIVE NOTE: Final technical rept. 20 Oct 89-19 Oct 92,

JAN 93

181P

PERSONAL AUTHORS: Creitzer, E. M.; Epstein, A. H.; Giles, M. B.; McCune, J. E.; Tan, C. S.

CONTRACT NO. AFOSR-90-0035

PROJECT NO. 2307

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0194, AFOSR

UNCLASSIFIED REPORT.

ABSTRACT: (U) This report describes work carried out at the Gas Turbine Laboratory at MIT during the period 10/20/88 - 10/19/92, as part of our multi-investigator effort on basic unsteady flow phenomena in turbomachines. Within the overall project four separate tasks are specified. These are, in brief: (1) The Influence of Inlet Temperature Nonuniformities on Turbine Heat Transfer and Dynamics; (2) Assessment of Unsteady Losses in Stator/Rotor Interactions; (3) Unsteady Phenomena and Flowfield Instabilities in Multistage Axial Compressors; IV. Vortex Wake-Compressor Blade Interaction in Cascades; A New Rapid Method for Unsteady Separation and Vorticity Flux Calculations.

DESCRIPTORS: (U) *UNSTEADY FLOW, *TURBOMACHINERY, COMPRESSOR BLADES, DYNAMICS, FLUID MECHANICS, GAS TURBINES, HEAT TRANSFER, INLETS, INTERACTIONS, LABORATORIES, LOSSES, MECHANICS, ROTORS, SEPARATION, STABILITY, STATORS, TEMPERATURE, TRANSFER, TURBINES, WAKE, FLOW FIELDS, AXIAL FLOW, VORTICES, CASCADES (FLUID DYNAMICS), AERODYNAMICS.

IDENTIFIERS: (U) Computational fluid mechanics, Transonic compressors, PE81102F, WUAFOSR2307DS.

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NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE
AND ENGINEERING

Al-1% Zn with Al2O3. All particle matrix interfaces
appeared to be incoherent.

(U) Tailored Interfaces for Metal-Matrix Composites-
Fundamental Considerations.

DESCRIPTORS: (U) *INTERFACES, *METAL MATRIX COMPOSITES,
ALLOYS, ALUMINUM, BONDING, BOUNDARIES, CARBIDES,
CHEMICALS, COHERENCE, DUCTILITY, ELECTRON MICROSCOPY,
ENERGY, HARDNESS, HEAT, KINETICS, PARTICLES, PHASE,
REDUCTION, SILICON CARBIDES, SPINEL, STABILITY, STEEL,
STRUCTURES, TEMPERATURE, THERMODYNAMICS, TITANIUM,
DISPERSIONS, RECRYSTALLIZATION, CHEMICAL REACTIONS,
MAGNESIUM ALLOYS.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 88-30 Nov
92.

JAN 93 99P

PERSONAL AUTHORS: Fine, Morris E.; Weertman, Julia R.

CONTRACT NO. AFOSR-89-0043

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0190, AFOSR

IDENTIFIERS: (U) Metal matrix composites, Interfaces,
Aluminum matrix, Magnesium matrix, Titanium carbide,
Silicon carbide, Spinel, PE61102F, WUAFOSR2308A1, Atomic
resolution, XD Process.

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research was to
investigate the interface properties and successful
metal matrix composites. Thermodynamic stability of the
interface and the phases in the composite, nature of the
bonding across the interface, and the energy and
structure of the interface were studied. With TiC
dispersed in Al prepared by the XD process, atomic
resolution electron microscopy showed a sharp interface
with large areas of partial coherence. The Al-TiC
composite is remarkably ductile even at 15 vol.% TiC
loading. This is attributed to the ability of the Al to
recrystallize at the interface forming semicoherent
boundaries and to a high level of metallic binding
between Al and Ti in TiC. On holding at 640 C the
kinetics of the reaction, 13Al + 3TiC - Al4C3 + 3Al3Ti,
is rapid enough to be observed. This reaction leads to a
substantial increase in strength and modulus but a
reduction in ductility. Like steel, parts could be formed
in the ductile state and then heat treated to increase
hardness and modulus. At still higher temperatures, Al
and TiC are the thermodynamically stable phases so no
reaction occurs. Four Mg alloy matrix composites were
received from Dow Chemical Corp.: Mg-6% Zn with SiC, Mg-
3% Ce-1% Mn with SiC, Mg-9% Al-1% Zn with SiC, and Mg-9%

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AD-A262 892 CONTINUED

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Crystallization of Nanocomposite Glasses Made by the SSG Process.

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 91-31 Dec 92,

JAN 93 85P

PERSONAL AUTHORS: Roy, Rustum; Komarneni, Sridhar

CONTRACT NO. AFOSR-89-0448

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0177, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The two main objectives of this research were: (a) to crystallize nanocomposite glasses through solid-state epitaxy and (b) to demonstrate the critical role of epitaxy in crystallization by fabricating sol-gel films on single crystal substrates of a particular orientation. During the last three years we have been able to achieve both these goals using several compositional systems. We have been able to crystallize through seeding albite (NaAlSi₃O₈) glass which has been considered to be impossible to crystallize. Orthoclase (KAISi₃O₈) which is extremely difficult to crystallize has also been crystallized using a compositionally multiphasic gel and crystalline seeds of KAISi₃O₈. Monoclinic BaAl₂Si₂O₈ has been crystallized at significantly lower temperatures by seeding with monoclinic BaAl₂Si₂O₈ or SrAl₂Si₂O₈ seeds. The effect of seeding has been minor or could not be detected in other glass systems such as Li₂O-Al₂O₃-SiO₂, Rb₂O-Al₂O₃-SiO₂ and Cs₂O-Al₂O₃-SiO₂. Little or no effect of seeding was found in non-oxide glasses such as silicon oxycarbide glasses. The role of epitaxy in crystallization has been demonstrated convincingly by making dense, epitaxial SrTiO₃ and TiO₂ thin films on single crystals of SrTiO₃

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and TiO₂ of a particular orientation. The nanocomposite approach which has been discovered and developed through AFOSR support to us is now a well established practice the world over.

DESCRIPTORS: (U) *CRYSTALLIZATION, *GLASS, *COMPOSITE MATERIALS, CRYSTALS, GELS, OXIDES, SEEDING, SEEDS, SILICON, SINGLE CRYSTALS, SOLIDS, SUBSTRATES, TEMPERATURE, THIN FILMS, EPITAXIAL GROWTH, SODIUM, POTASSIUM, ALUMINUM, OXYGEN, CALCIUM, STRONTIUM, BARIUM, LITHIUM, RUBIDIUM, CESIUM, TITANIUM.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *SSG(Solution Sol-Gel), Nanocomposites, *Solution sol-gel, Oxycarbides.

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DTIC REPORT BIBLIOGRAPHY

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AD-A262 890 12/5 12/9

CARNEGIE-MELLON UNIV PITTSBURGH PA

HARVARD UNIV CAMBRIDGE MA

(U) Development of Germanium-Silicon Growth Technology.

(U) Theory and Applications Of Neural Networks.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 92-31 Jan 93,

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-28 Feb 92,

FEB 93 15P

FEB 92 6P

PERSONAL AUTHORS: Greve, D. W.

PERSONAL AUTHORS: Brockett, Roger

PROJECT NO. 2305

CONTRACT NO. AFOSR-89-0506

TASK NO. ES

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC
TR-93-0185, AFOSR

TR-93-0185, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The growth of heterojunction internal photoemission detectors and multiple quantum well detectors for the far-infrared has been explored. Structures have been grown using ultrahigh vacuum chemical vapor deposition and have been characterized with X-ray diffraction, SIMS, RBS, and photoluminescence. Infrared response has been observed in some structures. Characterization performed to date has permitted the identification of growth parameters for experiments which will be performed in the next year.

ABSTRACT: (U) One of the main ideas underlying the interest in neural computing is that it may be possible to develop new computational paradigms that will make important aspects of programming both simple and more robust. The means for doing so usually involves usually involves setting up some universal difference or differential equation whose trajectories define rules for solving problems in curve fitting, interpolation, etc. The work has addressed the use of analog computation methods for optimization as well as sorting, quantizing, etc. Using a simple, but powerful, mathematical model they have shown, how basic subsystems can provide the building blocks that are capable of accounting for the operations that they see being performed by biological and digital computers. More specifically, they have shown that a certain class of gradient flows on the n dimensional orthogonal group generates effective means for solving a variety of combinatorial and linear algebra problems of the type that shows up in the neural network literature. A key idea here is that of an adaptive subspace filter - a general model for nonlinear filtering of the type seen in various cognitive applications. This model not only allows one to study global convergence in a precise way, but it allows one to make analytical predictions about the speed of convergence which then can be compared with the performance of natural systems. They have shown that some of the earlier analog models for sorting can be interpreted as conditions density propagators.

DESCRIPTORS: (U) *GERMANIUM, *SILICON, *EPITAXIAL GROWTH, DEPOSITION, DETECTORS, FAR INFRARED RADIATION, HETEROJUNCTIONS, IDENTIFICATION, INTERNAL, PARAMETERS, PHOTOELECTRIC EMISSION, PHOTOLUMINESCENCE, QUANTUM WELLS, STRUCTURES, VAPOR DEPOSITION, X RAY DIFFRACTION, MOLECULAR STRUCTURE, CHEMICAL REACTIONS, ULTRAHIGH VACUUM, WAFERS, BORON.

IDENTIFIERS: (U) SIMS(Secondary Ion Mass Spectrometry), RBS(Rutherford Backscattering Spectroscopy).

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *NEURAL NETS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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AD-A282 888 9/3 20/8 20/5

*ARTIFICIAL INTELLIGENCE, COGNITION, COMPUTATIONS, CURVE FITTING, DIFFERENTIAL EQUATIONS, DIGITAL COMPUTERS, INTERPOLATION, LINEAR ALGEBRA, MATHEMATICAL MODELS, NETWORKS, OPTIMIZATION, SORTING, THEORY, COMPUTER LOGIC, COMPUTER ARCHITECTURE, COMPUTER PROGRAMS, MATHEMATICAL ANALYSIS, NONLINEAR SYSTEMS, NONLINEAR PROGRAMMING, STATISTICAL PROCESSES, ALGORITHMS, LEARNING MACHINES, IMAGE PROCESSING.

PHYSICAL SCIENCES INC ANDOVER MA

(U) Energy Transfer Studies in Interhalogen Molecules.

DESCRIPTIVE NOTE: Final rept. 15 Aug 89-19 Nov 92,

JAN 93 59P

PERSONAL AUTHORS: Davis, S. J.; Holtzclaw, K. W.; Kessler, W. J.; Piper, L. G.

IDENTIFIERS: (U) PE61101E.

REPORT NO. PSI-1085/TR-1237

CONTRACT NO. F49620-89-C-0101

MONITOR: AFOSR, XC
TR-93-0167, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program is examining energy transfer processes in interhalogen molecules that have potential for visible chemical laser development. Spectrally resolved laser induced fluorescence is used to determine rotation-to-translation (R-T) and vibration-to-translation (V-T) rate coefficients. In this report we compare several fitting laws for R-T transfer to data obtained for IF and ICl interactions with several collision partners. We have also obtained preliminary data on V-T relaxation within the ground electronic state of IF. Preliminary results of an optically-pumped HF laser are also presented.

DESCRIPTORS: (U) *CHEMICAL LASERS, *MOLECULAR ROTATION, *MOLECULAR VIBRATION, ELECTRONIC STATES, ELECTRONICS, EMISSION, ENERGY TRANSFER, EXCITATION, LASER INDUCED FLUORESCENCE, LASERS, MOLECULES, RELAXATION, ROTATION, TRANSFER, TRANSLATIONS, VIBRATION, IODINE COMPOUNDS, KINETICS, GROUND STATE, OPTICAL PROPERTIES.

IDENTIFIERS: (U) Laser excitation, Amplified spontaneous emission, Iodine fluoride, Iodine chloride.

AD-A282 880

AD-A282 888

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COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB

ILLINOIS UNIV AT URBANA BOARD OF TRUSTEES

(U) Selective Processing Techniques for Electronics and Opto-Electronic Applications: Quantum-Well Devices and Integrated Optic Circuits.

(U) International Conference on Martensitic Transformations (ICOMAT 92).

DESCRIPTIVE NOTE: Annual rept. 15 Jul 92-14 Jan 93,

DESCRIPTIVE NOTE: Final rept. 30 Sep 91-31 Dec 92,

FEB 92 134P

MAR 93 104P

PERSONAL AUTHORS: Osgood, Richard M., Jr

PERSONAL AUTHORS: Wayman, C. M.

CONTRACT NO. F49820-92-J-0414, \$SDARPA Order-8321

CONTRACT NO. AFOSR-91-0380

MONITOR: AFOSR, XC
TR-93-0166, AFOSR

PROJECT NO. 2308

TASK NO. A2

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0199, AFOSR

ABSTRACT: (U) During this period, significant headway has been made on the key contract objectives. Several novel integrated optical devices have been demonstrated, and simulation of new devices is guiding further experiments. Our low-damage cryogenic etching technique has been demonstrated to be suitable for sub-micron patterning, and applied to device fabrication. Finally, light-induced wet-etching techniques have been used in several new and important areas of application.

ABSTRACT: (U) The author has studied the martensitic transformations and related phenomena, such as shape memory and superelasticity effects, in various ferrous and non-ferrous alloys for 41 years after graduation from a university in 1951. Main research results obtained by his group in the recent 41 years are introduced referring to those by other researchers, and unsolved problems are discussed. Then, future research subjects and their solvable techniques are surveyed with a little dogmatic view.

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *QUANTUM WELLS, *OPTICAL CIRCUITS, CONTRACTS, COUPLERS, CRYOGENICS, DAMAGE, ELECTRONICS, ETCHING, FABRICATION, FILTERS, LASERS, LIGHT, OPTICS, SEMICONDUCTOR LASERS, SEMICONDUCTORS, SIMULATION.

DESCRIPTORS: (U) *MARTENSITE, *TRANSFORMATIONS, SYMPOSIA, ABSTRACTS, ATOMS, NICKEL, TITANIUM ALLOYS, SOLITONS, TWINNING(CRYSTALLOGRAPHY), PLUTONIUM ALLOYS, PLASTIC PROPERTIES, NIOBIUM ALLOYS, COPPER, ZINC, MECHANICAL PROPERTIES, IRON, ALUMINUM, PALLADIUM, BORON HEAT, COBALT, NUCLEATION, SPINODAL DECOMPOSITION, AUSTENITE, MANGANESE, STABILIZATION, ZIRCONIUM, ELASTIC PROPERTIES, THIN FILMS.

IDENTIFIERS: (U) Wavelength, Filters, Quantum wells, Star couplers, Semiconductor lasers, IR Filters, Isolators, Integrated optics, Anisotropic etching, InP, Via etching optical wave simulation.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, Shape memory alloy.

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MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA
DEPT OF ELECTRICAL ENG INEERING

COLORADO STATE UNIV FORT COLLINS DEPT OF ELECTRICAL
ENGINEERING

(U) Statistical Techniques for Signal Processing.

(U) Multiparameter Radar and Aircraft Based Studies of the
Micro-Physical, Kinematic and Electrical Structure of
Convective Clouds.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92,

JAN 93 10P

DESCRIPTIVE NOTE: Annual rept. 15 Feb 92-15 Feb 93,

PERSONAL AUTHORS: Kassam, Saleem A.

FEB 93 15P

CONTRACT NO. AFOSR-90-0050

PERSONAL AUTHORS: Bringl, V. N.; Caylor, I. J.

PROJECT NO. 2304

CONTRACT NO. AFOSR-91-0141

TASK NO. A5

PROJECT NO. 2310

MONITOR: AFOSR, XC

TASK NO. CS

TR-93-0201, AFOSR

MONITOR: AFOSR, XC

TR-93-0198, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT.

ABSTRACT: (U) This report summarizes research accomplishments in the 3-year period Nov. 1, 1989 Oct. 31, 1992. The primary accomplishments were in the areas of (1) nonlinear and robust filters - order statistics and related filters, multivariate medians, analysis, and applications; (2) signal detection in non-Gaussian noise - ARE, quantization, distributed detection, nonparametric detection; and (3) nonlinear radial basis function networks in signal processing. Reference is made to 28 publications... Nonlinear filters, Robust estimates, Rank estimates, Non-parametric detection, Non-gaussian noise, CFAR Radar.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *STATISTICAL PROCESSES, DETECTION, ESTIMATES, GAUSSIAN NOISE, NETWORKS, NOISE, ORDER STATISTICS, QUANTIZATION, RADAR, SIGNALS, STATISTICS, NONPARAMETRIC STATISTICS, MULTIVARIATE ANALYSIS.

ABSTRACT: (U) Ongoing studies of the microphysical kinematic and electrical evolution of two convective clouds observed by radar and aircraft during the Convective and Precipitation Electrification Project (CaPE) are reported. A complete life-cycle of cloud evolution from radar first echo to mature phase is documented using reflectivity (ZH) and differential reflectivity (ZDp). Aircraft data from T-28, NOAA-P3, NCAR King Air and Wyoming King Air are in the process of being analyzed for particle type, electric field from field mills and up/down draft. Surface field mills and LLP data give an indication of first cloud-to-ground lightning time and location. Another on-going study is related to multiparameter radar studies of lightning echoes and a triggered lightning event.... Radar, Electrical, Storms, Lightning.

DESCRIPTORS: (U) *CLOUDS, *LIGHTNING, *RADAR, *CONVECTION(ATMOSPHERIC), AIRCRAFT, ECHOES, ELECTRIC FIELDS, LIFE CYCLES, PARTICLES, REFLECTIVITY, STORMS, ATMOSPHERIC PRECIPITATION, MOISTURE CONTENT, PARTICLE SIZE, WIND, RADAR CROSS SECTIONS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310CS.

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MATERIALS RESEARCH SOCIETY PITTSBURGH PA

GATES(CIRCUITS), GASES, MOLECULAR BEAMS, ORGANOMETALLIC COMPOUNDS, VAPOR PHASES, LAYERS, DOPING, GALLIUM ARSENIDES, THERMAL STABILITY, HETEROJUNCTIONS, BIPOLAR TRANSISTORS, DAMAGE CONTROL, PLASMA DEVICES, ELECTRICAL CONDUCTIVITY, OPTICAL PROPERTIES.

(U) Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 2-5 December 1991. Advanced III-V Compound Semiconductor Growth, Processing and Devices. Volume 240.

IDENTIFIERS: (U) Ohmic contact.

DESCRIPTIVE NOTE: Final rept. 15 Sep 91-14 Sep 92,

SEP 92 928P

PERSONAL AUTHORS: Ballance, John

CONTRACT NO. AFOSR-91-0411

MONITOR: AFOSR, XC
TR-93-0182, AFOSR

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight Rd., Pittsburgh, PA 15237. HC \$69.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) This proceedings volume results from a Materials Research Society symposium designed to cover the spectrum of activity in the III-V compound semiconductor arena. This ranges from the growth of epitaxial layers by any one of a number of different techniques, to the processing of these layers using wet and dry etching, ohmic contact or dielectric deposition, lithographic patterning, implantation, annealing or gate metal deposition, and finally to the operation of the completed device. Invited talks on many of these subjects are given first in each section, followed by contributed and poster papers. Of increasing interest at the present time is the development of gas-source epitaxial growth methods such as metal organic molecular beam epitaxy and organo-metallic vapor phase epitaxy. In particular the ability of these methods to produce highly p-type carbon-doped layers in the GaAs/AlGaAs system leads to improved reliability and thermal stability of heterojunction bipolar transistors and other related devices.

DESCRIPTORS: (U) *SEMICONDUCTOR DEVICES, *EPITAXIAL GROWTH, SYMPOSIA, GROUP III COMPOUNDS, GROUP IV COMPOUNDS, GROUP V COMPOUNDS, ETCHING, DIELECTRICS, DEPOSITION, LITHOGRAPHY, ION IMPLANTATION, ANNEALING, METALS,

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MATERIALS RESEARCH SOCIETY PITTSBURGH PA

MECHANICAL PROPERTIES, DEFORMATION, LAYERS, METALS, STRAIN(MECHANICS), RELAXATION, EPITAXIAL GROWTH, DISLOCATIONS, FAILURE(MECHANICS), ADHESION, FRACTURE(MECHANICS), SILICON, POLYCRYSTALLINE, POLYMERIC FILMS, DIODES, MAGNETRONS, VOIDS.

(U) Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 2-5 December 1991. Thin Films: Stresses and Mechanical Properties III. Volume 239.

DESCRIPTIVE NOTE: Final rept. 15 Sep 91-14 Sep 92. IDENTIFIERS: (U) Heteroepitaxial, Electromigration, Indentation.

SEP 92 724P

PERSONAL AUTHORS: Ballance, John

CONTRACT NO. AFOSR-91-0411

MONITOR: AFOSR, XC
TR-93-0183, AFOSR

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight Rd., Pittsburgh, PA 15237. HC \$69.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) The book begins with papers dealing with microstructural processes and intrinsic stresses in thin films. This is followed by papers on the stresses themselves and on thin film deformation processes. Mechanical testing techniques and the mechanical properties of thin films are presented next. Because indentation has become so important in the study of thin film mechanical properties, a special part of the symposium was devoted to modelling and experiments in indentation. The volume also includes a series of papers on the stresses and mechanical properties of multilayers, focussing mainly on metal multilayers with layer dimensions in the nanometer range. Strain relaxation in heteroepitaxial thin films by the formation of misfit dislocations continues to be one of the important research areas in this field, so a part of this volume is devoted to that topic. The last topics in the volume deal with failure processes in thin films. Papers on adhesion and fracture properties of thin films are grouped together in Part VII. The last part of the book deals with the phenomena of electromigration and stress induced voiding in interconnect metal films.

DESCRIPTORS: (U) *THIN FILMS, *STRESSES, SYMPOSIA.

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CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Study on Various Problems in Statistical Planning and Inference.

DESCRIPTIVE NOTE: Final rept. 15 Dec 90-14 Dec 92.

DEC 92 10P

PERSONAL AUTHORS: Ghosh, Subir

CONTRACT NO. AFOSR-81-0115

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSK, XC
TR-83-0200, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research done under this grant is (1) New main effect plus one plans and their robustness property against deletion of runs and (2) Robust experimental plan and its role in determining robust design against noise factors. The researchers near completion are on (1) Incorrectness of orthogonality condition for main effect plans, and (2) Determination of robust design against noise factors and in presence of signal factors.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, NOISE, ORTHOGONALITY, SIGNALS.

IDENTIFIERS: (U) WUAFOSR2304A5.

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AD-A262 483 6/5 6/1 6/14

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Wound Healing and Connective Tissue Metabolism: The Role of Hyperbaric Oxygen Therapy.

DESCRIPTIVE NOTE: Final rept. 1 Jul 91-30 Jun 92.

JUN 92 6P

PERSONAL AUTHORS: Harper, Elvin

CONTRACT NO. AFOSR-81-0413

PROJECT NO. 2312

TASK NO. A6

MONITOR: AFOSR, XC
TR-83-0202, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Effect of hyperbaric oxygen on wound healing by growth promoting factors: Epidermal growth factor (EGF), platelet derived growth factor (PDGF) and transforming growth factor B (TGF β). These compounds are of particular interest since they have been reported to increase collagenase secretion. EGF when applied directly to skin increased the rate of healing by 100%.

DESCRIPTORS: (U) *WOUNDS AND INJURIES, *HYPERBARIC MEDICINE, *METABOLISM, COLLAGENASE, HEALING, OXYGEN, RATES, SECRETION, TISSUES(BIOLOGY), GROWTH(PHYSIOLOGY), SKIN DISEASES, BLOOD PLATELETS, TISSUE CULTURE, PROTEINS, PEPTIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A6, Growth factor, EGF(Epidermal Growth Factor).

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GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Photodissociation Spectroscopy of Mg(+)-H₂O and Mg(+)-D₂O.

(U) Width of Particle Beams Desorbed in Electron Stimulated Desorption: O(+) and Metastable CO from CO/Pt(111).

DEC 92 11P

JAN 93 12P

PERSONAL AUTHORS: Willey, K. F.; Yeh, C. S.; Robbins, D. L.; Pilgrim, J. S.; Duncan, M. A.

PERSONAL AUTHORS: Szabo, Andras; Yates, John T., Jr

CONTRACT NO. AFOSR-91-0001

CONTRACT NO. AFOSR-89-0384

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A3

TASK NO. A2

MONITOR: AFOSR, XC
TR-93-0149, AFOSR

MONITOR: AFOSR, XC
TR-93-0154, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics v87 n12 p8886-8895, 15 Dec 92. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in Jnl. of Chemical Physics, v98 n1 p889-899, 1 Jan 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) In the present report, we describe photodissociation spectroscopy experiments on the hydrated magnesium ion, Mg⁺-H₂O, and its deuterated analog, Mg⁺-D₂O. A preliminary report on this system was the subject of a recent communication. Vibrationally resolved electronic spectra with partial rotational resolution are obtained for both systems, leading to the determination of their excited state vibrational constants, dissociation energies, and structures. These data are compared to the predictions of ab initio theory. Mg⁺ is an ideal prototype metal ion for the study of complexes because it is isoelectronic with neutral sodium atom.

DESCRIPTORS: (U) *MAGNESIUM, *IONS, *HYDRATES, *PHOTODISSOCIATION, SPECTROSCOPY, WATER, CATIONS, METAL COMPLEXES, ION MOLECULE INTERACTIONS, ELECTROSTATICS, CHEMICAL BONDS, LIGANDS, SOLVATION, ADSORPTION, SURFACES, LASERS, ELECTRONIC STATES, EXCITATION, MOLECULAR STRUCTURE, COMPLEX IONS, GROUND STATE, SUPERSONIC NOZZLES, ROTATION, ISOTOPES, FREQUENCY, SYMMETRY.

IDENTIFIERS: (U) PE81102F, Bending mode, Stretching mode.

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different directions.

FLORIDA UNIV GAINESVILLE

DESCRIPTORS: (U) *DESORPTION, *PLATINUM, *CARBON MONOXIDE, *OXYGEN, *CATIONS, *PARTICLE BEAMS, REPRINTS, ELECTRONS, WIDTH, VIBRATION, ADSORBATES, SURFACES, DISTRIBUTION, CHEMICAL BONDS, METASTABLE STATE, PARALLEL ORIENTATION, MOMENTUM, OSCILLATORS, EXCITATION, TEMPERATURE, ORDER DISORDER TRANSFORMATIONS, ANISOTROPY, SUBSTRATES, LAYERS, PHOTONS, IONS, PHONONS, ATOMS.

IDENTIFIERS: (U) PE61102F, Stimulated, Angular distribution, ESDIAD(Electron Stimulated Desorption-Ion Angular Distribution).

(U) Restricted Open-Shell Hartree-Fock-Based Many-Body Perturbation Theory: Theory and Application of Energy and Gradient Calculations,

NOV 92 16P

PERSONAL AUTHORS: Lauderdale, Walter J.; Stanton, John F.; Gauss, Jürgen; Watts, John D.; Bartlett, Rodney J.

CONTRACT NO. F49820-92-J-0141

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-93-0157, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v87 n8 p6606-6620, 1 Nov 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A new approach for many-body-perturbation theory (MBPT) built upon a restricted open-shell Hartree-Fock (ROHF) reference function is presented. ROHF-MBPT is shown to give much improved results compared to unrestricted Hartree-Fock (UHF) MBPT in cases where there is large spin contamination of the UHF reference function, and to converge much more rapidly to the infinite-order coupled-cluster result. Equations for analytical gradients at the MBPT(2) level are described and implemented. ROHF-MBPT and restricted open-shell Hartree-Fock single- and double-excitation coupled cluster (ROHFCCSD) applications are presented for several difficult cases. These include the structure and electron affinity of the CN radical; structure, binding energy, and vibrational frequencies of Li3; the structure and vibrational frequencies for the unobserved FCS molecule; and the multiplet structure of the Ni atom.... Restricted, Open-shell, Hartree-Fock, Gradient.

DESCRIPTORS: (U) *PERTURBATION THEORY, *ELECTRONS, *CORRELATION TECHNIQUES, *HARTREE FOCK APPROXIMATION, ATOMS, BODIES, CONTAMINATION, ENERGY, EXCITATION.

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FREQUENCY, GRADIENTS, MOLECULES, PERTURBATIONS, REPRINTS.

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE61102F. Many body perturbation theory.

(U) Wavelength Effects in the Photolysis of Ketones: Stereoisomerization and Magnetic Isotope 13(C)/12(C) Separation. A Probe for Adiabatic vs. Diabatic Trajectories during Bond Dissociation,

93 12P

PERSONAL AUTHORS: Step, E. N.; Tarasov, V. F.; Buchachenko, A. L.; Turro, N. J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0151, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v97 p363-373, 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The formation of a carbon-carbon bond between two carbon-centered radicals represents one of the simplest and most significant elementary steps in all of organic chemistry. Investigations of magnetic field and magnetic isotope effects on carbon-carbon bond formation involving geminate radical pairs (RPs) have provided important information on the subtleties of the elementary step of recombination of carbon radicals. A 'snip' and 'knit' strategy has been devised to investigate the details of how carbon-carbon bonds are formed from geminate radical pairs that are initially in a triplet state.

DESCRIPTORS: (U) *KETONES, *PHOTOLYSIS, *STEREOCHEMISTRY, *ISOMERIZATION, *CARBON, REPRINTS, WAVES, ISOTOPES, SEPARATION, PROBES, ADIABATIC CONDITIONS, TRAJECTORIES, CHEMICAL BONDS, DISSOCIATION, LIGHT, EXCITATION, CHEMICAL RADICALS, BENZYL RADICALS, MAGNETIC PROPERTIES.

IDENTIFIERS: (U) PE61102F, Wavelength effects, Diabatic trajectories, Triplet states, Dibenzyl ketone.

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Methyldeoxybenzoin, Diphenylpentan-3-one, Micelles, Acyl radicals.

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Positronium Interactions with Strained Surface Rings in Porous Silica.

DEC 92 7P

PERSONAL AUTHORS: Hopkins, B. J.; Zarda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3484

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0148, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Non-Crystalline Solids, v149, p269-274, 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Strained cyclic surface rings formed on pore surfaces of silica gels during thermal dehydroxylation are investigated using Raman scattering and annihilation of positronium. Strained three member rings are found to shorten orthopositronium lifetime significantly. Surface rings are broken by adsorbing water vapor onto pore surfaces which leads to increased orthopositronium lifetime. A correlation between positronium lifetimes and the amount of water adsorbed allows determination of the surface density of strained rings for samples fired at temperatures from 200 to 900 deg C. (Author)

DESCRIPTORS: (U) *SILICA GELS, *POSITRONIUM, POROSITY, REPRINTS, SURFACES, RINGS, INTERACTIONS, THERMAL PROPERTIES, RAMAN SPECTRA, SCATTERING, ANNIHILATION REACTIONS, ADSORPTION, WATER VAPOR, DENSITY, TEMPERATURE, SOLIDS, HYDROXYL RADICALS, SILICON, OXYGEN, DECAY.

IDENTIFIERS: (U) PE61103D, *Strained Rings, Pores, *Dehydroxylation, Sol-gel process, Lifetime, Shortens.

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YALE UNIV NEW HAVEN CT DEPT OF ASTRONOMY

(U) Development of a System for Accurate Forecasting of Solar Activity.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 91-14 Oct 92.

92 3P

PERSONAL AUTHORS: Sofia, Sabatino

CONTRACT NO. AFDSR-91-0053

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0161, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work on solar activity forecasting has concentrated on the search for correlations which would allow the forecast of a given cycle with an anticipation larger than 4 to 5 years. The work on solar dynamo modeling involved a formulation of a realistic model of magnetic diffusion. This work is essentially complete and is capable of handling reliably the small scale interaction between convection and magnetic fields. Significant progress has occurred in the Solar Disk Sextant work with the completion of the wedge fabricated by optical contact. A successful balloon flight has yielded 20 gigabytes of data for which reduction and analysis methods are being developed.

DESCRIPTORS: (U) *FORECASTING, *SOLAR ACTIVITY, *SOLAR CYCLE, *BALLOONS, CONVECTION, DIFFUSION, FORMULATIONS, HANDLING, INTERACTIONS, MAGNETIC FIELDS, MODELS, SEXTANTS, WEDGES, REPRINTS.

IDENTIFIERS: (U) PE81102F.

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STATE UNIV OF NEW YORK AT ALBANY RESEARCH FOUNDATION

(U) Plastic Deformation of Granular Materials.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Nov 92.

JAN 93 12P

PERSONAL AUTHORS: Pitman, E. B.

CONTRACT NO. AFOSR-90-0076

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0174, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project combines analytic and computational investigations to understand the dynamics of elastic-plastic deformation of granular materials, particularly issues related to the formation of shearbands. Roughly speaking, shearbands form when the governing equations cease to be well-posed. Our research examines the issue of well-posedness, loss of hyperbolicity, and regularization. This final report summarizes our work on (1) computation of deformation and formation of shear bands in granular material; (1) analysis of a gradient theory of granular plasticity; (2) related elastic and viscoelastic systems of PDE which may lose hyperbolicity... Granular material, Plastic deformation, Hyperbolic equations.

DESCRIPTORS: (U) *GRANULAR MATERIALS, *PLASTIC DEFORMATION, COMPUTATIONS, DEFORMATION, DYNAMICS, EQUATIONS, GRADIENTS, MATERIALS, PLASTIC PROPERTIES, THEORY, ELASTIC PROPERTIES, SHEAR PROPERTIES, LOSSES, VISCOSITY, HYPERBOLIC DIFFERENTIAL EQUATIONS, COMPOSITE MATERIALS.

IDENTIFIERS: (U) PE81102F, Well-posed, Hyperbolicity, Regularization, Shearbands.

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STANFORD UNIV CA DIV OF APPLIED MECHANICS

WRIGHT STATE UNIV DAYTON OH SCHOOL OF MEDICINE

(U) Mechanics in Material Space.

(U) Hepatic Metabolism of Perfluorinated Carboxylic Acids and Polychlorotrifluoroethylene: A Nuclear Magnetic Resonance Investigation in Vivo.

DESCRIPTIVE NOTE: Final rept. 1 Apr. 80-31 Jul 82.

DEC 92 27P

DESCRIPTIVE NOTE: Annual technical rept. 15 Dec 91-14 Dec 92,

PERSONAL AUTHORS: Herrmann, George

JAN 93 23P

CONTRACT NO. AFOSR-80-0195

PERSONAL AUTHORS: Reo, Nicholas V.

MONITOR: AFOSR, XC

CONTRACT NO. AFOSR-80-0148

UNCLASSIFIED REPORT

PROJECT NO. 2312

TASK NO. AS

ABSTRACT: (U) Considerable advances have been achieved during the period reported. Conservation laws and path-independent integrals in non-homogeneous plane elastostatics have been established. Further, conservation laws for non-homogeneous bars and beams of variable cross-section, as well as for non-homogeneous plates have been constructed. These laws should permit a more direct and simple analysis of cracks and other defects in these structural elements. A significant breakthrough came in our success of constructing conservation laws for dissipative systems. Until now, it was possible to construct conservation laws only for systems which had a Lagrangian. We have now succeeded in establishing a general procedure, which we call the Neutral Action method, which allows the construction of conservation laws (and path-independent integrals) for systems with damping, for which no systematic procedures existed before. Thus we have generalized in an important and practical way the classical, celebrated theorem of Noether to a large class of technically more realistic systems.

DESCRIPTORS: (U) *STRUCTURAL COMPONENTS, CONSTRUCTION, CRACKS, CROSS SECTIONS, DAMPING, INTEGRALS, NEUTRAL PATHS, PLATES, RODS, DEFECTS(MATERIALS), BEAMS(STRUCTURAL), LOAD DISTRIBUTION, VISCOELASTICITY, DISPLACEMENT, STRESSES, DIFFERENTIAL EQUATIONS, FRACTURE(MECHANICS).

IDENTIFIERS: (U) *Conservation laws, Noethers theory, Bernoulli Euler Beam.

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UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes our studies of the effects of perfluorooctanoic acid (PFOA) and perfluorodecanoic acid (PFDA) on hepatic carbohydrate and phospholipid metabolism. Previously we have shown that PFDA inhibits hepatic glycogenesis from glucose in rats. In recent studies using carbon-13 nuclear magnetic resonance (NMR) spectroscopy, PFDA-treated rats show active gluconeogenesis from (3-13) Alanine and the incorporation of the 13C label into hepatic glycogen. The rate of alanine utilization is 40% greater in controls than PFDA-treated rats, and liver glucose-6-phosphate levels are about 40% lower in PFDA rats as compared to controls ($p < 0.02$). These results suggest that the PFDA-induced inhibition in glycogenesis from glucose is due to a dysfunction in the glucose transporter and/or glucokinase activity. In separate studies involving liver phosphorus metabolism, 31 P NMR was used to examine the effects of PFDA, PFOA, and clofibrate (CLOF) in both rats and guinea pigs. A unique effect is revealed in PFDA-treated rats in which a significant increase is observed in liver phosphocholine from 2.31 ± 0.23 $\mu\text{mol/g}$ tissue on day 1 post dose to 4.56 ± 0.21 $\mu\text{mol/g}$ on day 5. These levels are 2 to 4-fold greater than those measured in controls. The results indicate an enhanced turnover of

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liver phosphatidylcholine. Ongoing research efforts focus on the effects of PFDA on diacylglycerol levels, phospholipase C activity, and will examine the physical interaction of PFDA with phospholipid membranes.

DESCRIPTORS: (U) *NUCLEAR MAGNETIC RESONANCE, *CARBOXYLIC ACIDS, ALANINES, CARBOHYDRATES, CARBON, DYSFUNCTION, GLUCOSE, GLYCOPEN, GUINEA PIGS, INHIBITION, INTERACTIONS, LABELS, LIVER, MEMBRANES, METABOLISM, PHOSPHATES, PHOSPHOLIPIDS, RATES, RATS, SPECTROSCOPY, UTILIZATION, ISOTOPE EFFECT, IN VIVO ANALYSIS, BILE, BIOSYNTHESIS, BLOOD PLASMA, LABORATORY ANIMALS, METABOLITES, SAMPLING, SPECTRA, URINE.

IDENTIFIERS: (U) PE81102F, Polychlorotrifluoroethylene, Carbon 13.

AD-A262 446 7/6 20/2 11/4 20/8

MICHIGAN UNIV ANN ARBOR DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Tailored Organometallic Polymers.

DESCRIPTIVE NOTE: Final rept. May 89-Oct 92.

JAN 93 131P

PERSONAL AUTHORS: Laine, Richard M.; Viney, Christopher; Corriu, Robert J.

CONTRACT NO. F49620-89-C-0059

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0188, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Molecular tailoring concepts were applied to the synthesis of novel inorganic and organometallic polymers, many of them starting from commonly available polymorphs of SiO₂ (beach sand). Liquid crystalline molecular order was identified in random co-oligomers and copolymers of bis(catecholato) spiroloxanes. Factors affecting the nature and distribution of microstructural defects in liquid crystalline materials were identified, with a view to minimizing the scattering of light as it passes through such materials... Organometallic polymers, Hypervalent silicon, High temperature, Liquid crystalline, Non-linear optical.

DESCRIPTORS: (U) *POLYMERS, *ORGANOMETALLIC COMPOUNDS, *SILICON DIOXIDE, COPOLYMERS, HIGH TEMPERATURE, LIGHT, MATERIALS, OLIGOMERS, SAND, SCATTERING, SILICON, SYNTHESIS, TEMPERATURE, MOLECULAR STRUCTURE, INORGANIC COMPOUNDS, LIQUID CRYSTALS, SILOXANES, DEFECT ANALYSIS, MICROSTRUCTURE, NONLINEAR OPTICS, COMPOSITE MATERIALS.

IDENTIFIERS: (U) PE81102F, Bis(Catecholato) spiroloxanes, Hypervalent, Tailored.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A262 445 CONTINUED

COLORADO UNIV AT BOULDER DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Structure and Properties of Novel Compounds of Silicon, Germanium and Tin.

DESCRIPTIVE NOTE: Final rept. 1 Oct 80-30 Sep 82.

NOV 82 7P

PERSONAL AUTHORS: Michl, Josef

CONTRACT NO. AFOSR-81-0032

PROJECT NO. 2303

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0178, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work on the organic chemistry of silicon, germanium, and tin containing compounds concentrated on the investigation of novel structures and bonding situations, particularly compounds of multiply bonded and divalent atoms of these elements. In the recent years, our interest gradually gravitated towards an interrogation of the electronic structure and bonding in saturated compounds of these elements, most of all, silicon. We believe that an understanding of this subject will have quite general consequences for the understanding of the nature of delocalized chemical bonding in saturated compounds of all main-group elements. After all, the fact that bonding in saturated compounds is not strictly a matter of entirely localized single bonds is responsible for many theoretically and practically important properties of these compounds: sigma delocalization plays an essential role in phenomena as diverse as charge transfer through 'inert' spacers, propagation of substituent effects, propagation of spin density in saturated radicals, nuclear-nuclear coupling in NMR of saturated molecules, their optical activity, far UV absorption, ionization, etc.

DESCRIPTORS: (U) *SILICON, *GERMANIUM, *TIN, MOLECULAR STRUCTURE, ELECTRONIC STATES, ORGANIC COMPOUNDS, CHEMICAL

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BONDS, CHEMICAL ELEMENTS, CHEMICAL PROPERTIES, CHARGE TRANSFER, SPIN STATES, DENSITY, CHEMICAL RADICALS, NUCLEAR PROPERTIES, COUPLINGS, MOLECULES, NUCLEAR MAGNETIC RESONANCE, OPTICAL PROPERTIES, ABSORPTION, IONIZATION, INERT MATERIALS, POLYSILANES, SILANES, POLYMERS.

IDENTIFIERS: (U) PE61102F, Saturated, 'Inert' spacers, Silylenes, Oligosilanes.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4I55F

AD-A262 443 11/8.1 7/2 20/11 20/2

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATERIALS
SCIENCE AND ENGINEERING(U) Fundamentals of Mechanical Behavior in Intermetallic
Compounds.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-30 Sep 92.

FEB 93 15P

PERSONAL AUTHORS: Howe, James M.; Thompson, Anthony W.

CONTRACT NO. MEMS-ALC-18

PROJECT NO. 2308

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0178, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program has examined mechanical behavior and creep of titanium aluminide alloys, both based on Ti3Al and TiAl, with the goal being better understanding of relationships between microstructure and mechanical properties of these intermetallic compound-based alloys. Detailed microstructural characterization has been conducted for both types of aluminide alloys. For Ta additions to TiAl alloys, which are thought to improve ductility, lowered stacking fault energy and increased twinning have been found. For a Ti3Al-based alloy, detailed stress and temperature dependences of creep have been measured, and a strong microstructural dependence of creep properties has been established.

DESCRIPTORS: (U) *ALLOYS, *INTERMETALLIC COMPOUNDS, *TITANIUM ALUMINIDE, ALUMINIDES, CREEP, DUCTILITY, ENERGY, FAULTS, MECHANICAL PROPERTIES, MICROSTRUCTURE, STACKING, TEMPERATURE, TANTALUM, STRESSES, TWINNING(CRYSTALLOGRAPHY)

IDENTIFIERS: (U) PEG1102F

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AD-A262 441 7/2 7/5 20/5

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Velocity Relaxation of S(1D) by Rare Gases Measured by
Doppler Spectroscopy.

DEC 92 9P

PERSONAL AUTHORS: Nan, G.; Houston, P. L.

CONTRACT NO. F49620-92-J-0080

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0180, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n11 p7865-7872, 1 Dec 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Velocity relaxation of S(1D) by He, Ar, and Xe has been monitored by measuring the Doppler profile of the S(1D) for variable collision partner pressures at a fixed time delay following creation of S(1D) by pulsed laser photolysis of OCS at 222 nm. The nascent S(1D) has a mean speed about three times that at room temperature and an effective anisotropic parameter of Beta=0.5. A calculation assuming elastic hard-sphere collisions is performed to model the process. The data are in qualitative agreement with the model in that the angular distribution relaxes more rapidly with collision number as the mass ratio between the collision partner and sulfur approaches infinity, whereas the speed distribution relaxes more rapidly as the mass ratio approaches zero. Helium behaves as predicted by the hard-sphere model with a collision cross section of sigma = 28 +/- 2 A sup, 2. However, the cross sections for argon and xenon are found to depend on the collision energy. The dependence allow an estimation of the following Lennard-Jones parameters: for argon sigma = 3.8 +/- 0.5 A and epsilon = 2.5 +/- 0.5 kJ/mol; for xenon sigma = 3.9 +/- 0.5 A and epsilon = 3.9 +/- 0.8 kJ/mol. Sulfur, Velocity, Vacuum ultraviolet light, Molecular dynamics, Doppler spectroscopy.

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AD-A262 440 7/4 20/10 20/5 12/1

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

DESCRIPTORS: (U) *ARGON, *HELIUM, *RELAXATION,
 *SPECTROSCOPY, *SULFUR, *VELOCITY, *XENON, *RARE GASES,
 *DOPPLER SYSTEMS, ANISOTROPY, COLLISIONS, CROSS SECTIONS,
 DELAY, DYNAMICS, ENERGY, LASERS, LIGHT, MASS, MEAN,
 MODELS, NUMBERS, PARAMETERS, PHOTOLYSIS, PRESSURE,
 PROFILES, PULSED LASERS, RATIOS, ROOM TEMPERATURE,
 SPHERES, TEMPERATURE, TIME, VACUUM, VARIABLES, REPRINTS,
 ELASTIC PROPERTIES, MOLECULAR PROPERTIES, MOTION,
 KINETICS, BOLTZMANN EQUATION.

(U) The ACES II Program System.

92

17P

PERSONAL AUTHORS: Stanton, John F.; Gauss, Jurgen; Watts,
 John D.; Lauderdale, Walter J.; Bartlett, Rodney J.

CONTRACT NO. F49620-92-J-0141

IDENTIFIERS: (U) PE81102F, Lennard-Jones parameters, OCS,
 Vacuum ultraviolet light.

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
 TR-93-0158, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in International Jnl. of Quantum
 Chemistry, s28 p879-894, 1992. Available only to DTIC
 users. No copies furnished by NTIS.

ABSTRACT: (U) ACES II, a new program system for ab
 initio electronic structure calculations is described.
 The strengths of ACES II involve the use of many-body
 perturbation theory (MBPT) and coupled-cluster (CC)
 theory for calculating the energy, geometry, spectra, and
 properties of small- to medium-sized molecules. This
 paper gives a brief overview of the ACES II project,
 describes many features of the program system and
 documents a number of benchmark calculations. (Author)

DESCRIPTORS: (U) *QUANTUM CHEMISTRY, COMPUTATIONS,
 REPRINTS, ELECTRONIC STATES, MOLECULAR STRUCTURE,
 PERTURBATION THEORY, COUPLINGS, CLUSTERING, ENERGY,
 GEOMETRY, SPECTRA, MOLECULES.

IDENTIFIERS: (U) PE81102F, ACES II Computer program, Ab
 initio Calculations, MBPT(Many-Body Perturbation Theory).

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) An Electron Spin Polarization Study of the Interaction of Photoexcited Triplet Molecules with Mono- and Polynitroxyl Stable Free Radicals.

93 10P

PERSONAL AUTHORS: Turro, Nicholas J.; Khudyakov, Igor V.; Bossmann, Stefan; Dwyer, David W.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0155, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v97 p1138-1148, 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Time-resolved electron spin resonance (TR ESR) has been used to investigate the chemically induced dynamic electron polarization (CIDEP) generated by the interaction of stable free radicals with the triplet states of benzophenone, benzil, and 2-acetylnaphthalene. The stable radicals were mono-, di-, tri-, and tetranitroxyl free radicals possessing the 2,2,6,6-tetramethylpiperidine-N-oxyl moiety. All of the stable radical system investigated were found to be emissively polarized by interaction with the triplet states, and the phase of polarization was independent of the sign of zero-field splitting ($\pm D$) of the interacting triplet molecule. Possible and likely mechanisms of polarization of photoexcited (creation) resulting from the interaction of photoexcited triplet molecules with nitroxyls in the strong electron exchange are discussed. The emissive CIDEP of nitroxyls observed in the interactions with triplet benzil, which has $D > 0$, provides the strong support for the operation of the radical-triplet pair mechanism. (Author)

DESCRIPTORS: (U) *FREE RADICALS, *ELECTRON SPIN RESONANCE, MOLECULES, REPRINTS, STABILITY, EXCITATION.

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PHOTOCHEMICAL REACTIONS, POLARIZATION, INTERACTIONS, PIPERIDINES, METHYL RADICALS, SPECTRA, KETONES, BENZOPHENONES, NAPHTHALENES.
IDENTIFIERS: (U) PE61102F, *Polynitroxyl, Triplet states, Photo excited, Time-resolved, CIDEP (Chemically Induced Dynamic Electron Polarization), Benzil, 2-acetylnaphthalene, 2,2,6,6-tetramethylpiperidine, Zero-field splitting, Micelles, *Nitroxyl radicals.

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AD-A262 404 9/1 9/5

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Artificial Intelligence Methodologies in Flight Related Differential Game, Control and Optimization Problems.

(U) Optically Controlled Solid State Opening Switches.

DESCRIPTIVE NOTE: Final rept. 30 Sep 89-29 Dec 92,

JAN 93 175P

92 234P

PERSONAL AUTHORS: Rodin, Ervin Y.

PERSONAL AUTHORS: Lee, Chi H.; Rhee, M. J.

CONTRACT NO. AFOSR-89-0518

CONTRACT NO. AFOSR-88-0246

PROJECT NO. 3484

PROJECT NO. 2301

TASK NO. D7

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0187, AFOSR

MONITOR: AFOSR, XC
TR-93-0187, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Artificial intelligence methodologies have been applied to the modeling and implementation of control systems and differential games problems. To be more specific, artificial neural networks, a multiple instruction multiple data parallel processor tuned by connection weights, are used to model a control system or used as an identifier/controller which functions as a mapping between two information domains. Significant advances have been achieved in applying differential games theory to practical problems.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *CONTROL SYSTEMS, *GAME THEORY, FUNCTIONS, INSTRUCTIONS, MAPPING, MODELS, NETWORKS, NEURAL NETS, PARALLEL PROCESSORS, RECREATION, WEIGHT, PROBLEM SOLVING.

IDENTIFIERS: (U) WUAFOSR3484D7.

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ABSTRACT: (U) This is the final technical report for a research program to study optical controlled solid state opening switches. This program covers the period between August, 1988 and May, 1992 under the grant No. AFOSR-88-0246. The goal of the research is to study fundamental issues in a novel scheme to generate high power electrical pulsed power using optical controlled solid state opening switches. An optically controlled pulsed power system has been developed which is capable of delivering high power pulsed energy. This system employs a photoconductive semiconductor switch (PCSS) in an inductive energy storage pulsed power system (IESPPS). IESPPS offer advantage of small size with voltage and power step-up. However IESPPS imposes several stringent requirements on the switch. In fact, the switch must be nearly ideal with regard to fast opening time and low on-state resistance. Nevertheless, the PCSS performs quite well, yielding power gains of 50 with power output of nearly 100 kW. In this work, the pulse forming theories in the dual of the LC generator, the current charged transmission line (CCTL) and the dual of the Blumlein line DBL are studied for the first time.

DESCRIPTORS: (U) *SEMICONDUCTORS, *OPTICAL SWITCHING, *ELECTRIC SWITCHES, *PHOTOCONDUCTORS, *PULSE GENERATORS, ENERGY STORAGE, GENERATORS, HIGH POWER, POWER GAIN,

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PULSES, RESISTANCE, SWITCHES, TRANSMISSION LINES, VOLTAGE,
DIAMONDS, GRAPHITE, LASERS, SWITCHING CIRCUITS, OPTICAL
CIRCUITS, FLASH LAMPS, PULSED LASERS, SOLID STATE
ELECTRONICS.

MICHIGAN UNIV ANN ARBOR DEPT OF MECHANICAL ENGINEERING
AND APPLIED MECHANICS

(U) Mechanics of Elevated Temperature Fatigue Damage in
Fiber-Reinforced Ceramics.

IDENTIFIERS: (U) WUAFOSR2301A7.

DESCRIPTIVE NOTE: Final rept. 1 Dec 80-30 Nov 92.

JAN 93 73P

PERSONAL AUTHORS: Holmes, John W.

CONTRACT NO. AFOSR-91-0106

PROJECT NO. 2308

TASK NO. 8S

MONITOR: AFOSR, XC
TR-93-0172, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of the research conducted under Grant No. 91-0106 (a two year effort) was to identify the fundamental mechanisms of fatigue damage that occur in fiber-reinforced ceramics. Several new findings were made during the research effort: (1) the fatigue life of fiber-reinforced ceramics decreased markedly during high frequency fatigue loading, (2) fiber-reinforced ceramics undergo significant internal heating during cyclic loading, (3) because of frictional wear along the fiber-matrix interface, the frictional shear stress in fiber-reinforced ceramics decreases sharply under cyclic loading. Based upon insight gained from the analytical and experimental parts of the investigation, we developed a novel approach to estimate the level of frictional shear stress that exists along the fiber-matrix interface during fatigue. Since this technique allows confirmation of other techniques for estimating frictional shear stress (e.g., fiber pushout technique developed by Marshall at Rockwell Science Center). Moreover, it is the only approach that allows determination of the in-situ change in frictional shear stress during cyclic loading (note that the level of frictional shear stress controls many mechanical properties such as strength, toughness and mechanical damping as well as thermophysical properties such as thermal diffusivity). The analysis

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that was developed to estimate frictional shear stress can also be used to understand the relationship between composite microstructure and cyclic energy dissipation in fiber-reinforced ceramics.

DESCRIPTORS: (U) *FATIGUE LIFE, *CERAMIC MATERIALS, *FIBER REINFORCED COMPOSITES, CONTROL, DAMAGE, DAMPING, DETERMINATION, DIFFUSIVITY, DISSIPATION, ENERGY, ESTIMATES, HEATING, INTERFACES, INTERNAL, MECHANICAL PROPERTIES, MICROSTRUCTURE, TOUGHNESS, WEAR, CYCLIC LOADS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306BS.

AD-A262 362 12/9 12/1

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

(U) Wavelet Local Extrema Applied to Image Processing.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

DEC 92 7P

PERSONAL AUTHORS: Mallat, Stephane

CONTRACT NO. AFOSR-90-0040

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0184, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research project had two components. In the first part, we developed a numerical method, based on the wavelet transform, for the solution of partial differential equations. Singularities and sharp transitions in solutions of partial differential equations model important physical phenomena, which are hard to simulate with conventional numerical methods. In collaboration with Pfr. Papanicolaou and Bacry, we introduced a numerical scheme based on the orthogonal wavelet transform, that adapts the computational resolution in space and time to the regularity of the solution. This scheme saves computations by concentrating the computational effort in regions where singularities or sharp transitions occur. It has been tested on the Burgers equation.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *IMAGE PROCESSING, COMPUTATIONS, RESOLUTION, TIME, TRANSITIONS, NUMERICAL METHODS AND PROCEDURES, MATHEMATICAL MODELS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F, *Wavelets, Singularities, Burgers equation.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS
SCIENCE AND ENGINEERING

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Development of Model Based Magnetic LP-LEC Growth of
Large Diameter GaAs.

(U) Random-Like Interconnects, Fault Tolerance and Grain-
Size Studies for Optoelectronic Computing.

DESCRIPTIVE NOTE: Final rept. 15 Jun 81-14 Jun 82.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-15 Sep 92,

JUN 92 21P

SEP 92 34P

PERSONAL AUTHORS: Witt, August F.

PERSONAL AUTHORS: Esener, S. C.; Patur, R.; Lee, S. H.

CONTRACT NO. AFOSR-91-0355

CONTRACT NO. AFOSR-89-0440

MONITOR: AFOSR, XC

PROJECT NO. 2305

TR-93-0189, AFOSR

TASK NO. DS

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0188, AFOSR

ABSTRACT: (U) The objective of this research was to explore the range of analytical information on the defect structure of doped and semi-insulating GaAs obtainable from computational, non-invasive, near infrared absorption analysis. Motivation for this research was provided by the realization that the establishment of meaningful property specifications for device materials is contingent on noninvasive defect analysis executable in a fabline environment. Infrared absorption measurements on a micro- and macro-scale in combination with computational image processing and analysis were found to meet the requirements of the stated research objectives.

DESCRIPTORS: (U) *DEFECT ANALYSIS, *SEMICONDUCTORS, *OPTICAL ANALYSIS, GALLIUM ARSENIDES, IMAGE PROCESSING, MATERIALS, STRUCTURES, MATHEMATICAL ANALYSIS, DOPING, DENSITY, ANNEALING, STRUCTURAL ANALYSIS.

IDENTIFIERS: (U) Near infrared microscopy.

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UNCLASSIFIED REPORT

ABSTRACT: (U) Our objective during the funding period, July 1, 1989 to September 15, 1992, was to investigate random like interconnects, fault tolerance, and grain size studies for optoelectronic parallel processors. The major focus has been in the design and analysis of parallel optoelectronic interconnection networks. Two major areas were identified and researched. The first involves the design, analysis, and simulation of perfect shuffle-based optoelectronic multistage interconnection interconnection networks (MINS) for highly parallel computers. The objective was first to perform a quantitative performance comparison between optoelectronic and VLSI implementations of multistage interconnection networks (MINS). The next task was to optimize the optoelectronic MIN with respect to architectural and technological parameters. The final goal was to design and simulate a MIN system that could provide a complete set of communication and synchronization services.

DESCRIPTORS: (U) *PARALLEL PROCESSORS, COMPUTERS, FAULT TOLERANCE, GRAIN SIZE, PARAMETERS, TOLERANCE, VERY LARGE SCALE INTEGRATION, COMPUTER NETWORKS, COMPUTERIZED SIMULATION, ELECTROOPTICS.

IDENTIFIERS: (U) WUAFOSR2305DS, PEB1102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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RICE UNIV HOUSTON TX

(U) Energy and Chemical Change.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, Elucidation.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 92.

JAN 93 71P

PERSONAL AUTHORS: Kinsey, James L.; Levine, Raphael D.

CONTRACT NO. AFOSR-88-0158

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0193, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall object of this project was a better theoretical understanding of the dynamics of energy rich molecules 'in both bound and unbound states. Particular attention was to be given to the understanding and elucidation of selectivity in the role of initial energy acquisition and its subsequent disposal. Some effort was directed at the understanding of such selectivity not only for isolated molecules but also for molecule-surface collisions. Two novel methodologies were developed and brought to fruition during these studies. One is the use of algebraic Hamiltonians for the description of high overtones (and hence highly anharmonic) energy rich states and the determination of the potential energy from observed spectra in this way. Very extensive work has demonstrated the realistic feasibility of this approach for triatomic molecules (both linear and bent) and for linear tetratomic molecules. A complete summary of this approach has just been written up for publication as a book which includes table of parameters of algebraic Hamiltonians for a variety of molecules.

DESCRIPTORS: (U) *MOLECULAR PROPERTIES, *HAMILTONIAN FUNCTIONS, *MOLECULAR VIBRATION, COLLISIONS, DYNAMICS, ENERGY, MOLECULES, POTENTIAL ENERGY, SPECTRA, SURFACES, MOLECULAR ENERGY LEVELS, ENTROPY, RAMAN SPECTRA, STEREOCHEMISTRY, SURFACE CHEMISTRY.

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PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL
ENGINEERING

(U) Investigation of a New Concept in Semiconductor
Microwave Oscillators: The Contiguous Domain
Oscillator.

oscillation frequency determined by the inverse of the
generation time plus the transit time. Clearly, once the
device has been built, the transit time (and hence the
oscillation frequency) is fixed. In addition, for
millimeter-wave operation the drift distance must be made
very short, typically less than 1 micrometer.

DESCRIPTIVE NOTE: Final rept. 1 Jul 91-31 Dec 93,

DESCRIPTORS: (U) *MICROWAVE OSCILLATORS, *SEMICONDUCTOR
DEVICES, FREQUENCY DOMAIN, ELECTRICAL RESISTANCE,
GATES(CIRCUITS), COMPUTERIZED SIMULATION, GALLIUM
ARSENIDES, MILLIMETER WAVES, INTEGRATED CIRCUITS,
ELECTROSTATICS.

FEB 93 139P

PERSONAL AUTHORS: Cooper, James A., Jr

CONTRACT NO. AFOSR-91-0224

IDENTIFIERS: (U) *Contiguous domain oscillator.

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XC
TR-93-0192, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The contiguous domain oscillator (CDO) is a resistive-gate GaAs FET which functions as a voltage-controlled millimeter-wave oscillator. The structure is compatible with planar processing and can be incorporated with standard GaAs FET in the form of monolithic millimeter-wave integrated circuits (MMICs). The device has been under investigation at Purdue since 1983, and was first proposed by Cooper and Thorner in 1985. Conventional microwave oscillators (such as the IMPATT, BARITT, and Gunn diodes) generate microwave power by using a mechanism which depends strongly on electric field (e.g. avalanche multiplication or negative differential mobility) to create charge packets or domains. The conventional devices all employ a two-terminal geometry and hence are diodes. Since the internal electrostatic geometry is one dimensional, once a charge packet is introduced, it alters the electric field throughout the device in such a way as to turn off the generation mechanism. The single charge packet then drifts across the device and is extracted by the anode. Once the charge packet has drifted out of the device, the internal field returns to its original value and the generation process begins again. The entire process is therefore a series of repeated transients, with the

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Spin-Orbit Coupling in Free-Radical Reactions: On the Way to Heavy Elements,

93 35P

PERSONAL AUTHORS: Khudyakov, Igor V.; Serebrennikov, Yuri A.; Turro, Nicholas J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-93-0156, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Reviews, v93 p537-570, 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) In this review article we have considered the manifestation of Spin Orbit Coupling in the elementary acts of formation and decay of exciplexes, radical pairs, biradicals, and other intermediates of importance to photochemistry. The major conclusion is that the spin orbit coupling acts in two ways, one promoting the magnetic field effect and the other quenching magnetic field effect, and that spin orbit coupling promotes magnetic field effect through two major mechanisms (triplet mechanism and delta g) and quenches the magnetic field effect creating a general sink for the spin coherency in a system.... Spin orbit coupling, Radical pair reactions, Magnetic field effects, Triplet mechanism, Heavy atoms.

DESCRIPTORS: (U) *ATOMIC SPECTROSCOPY, ATOMS, COUPLINGS, DECAY, MAGNETIC FIELDS, ORBITS, PHOTOCHEMICAL REACTIONS, QUENCHING, CHEMICAL RADICALS, HEAVY METALS, REPRINTS.

IDENTIFIERS: (U) PE61102F, Spin orbit coupling, Triplet spectra, Heavy atoms.

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CASE WESTERN RESERVE UNIV CLEVELAND OH DEPT OF MATERIALS SCIENCE AND ENGINEER ING

(U) Niobium Silicides for High Temperature Applications.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 89-31 Dec 92.

JAN 93 55P

PERSONAL AUTHORS: Lewandowski, John J.

CONTRACT NO. AFOSR-89-0508

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0171, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The processing and properties of advanced intermetallics based on alumina and silicide matrices have been investigated. Vacuum hot press techniques were utilized to produce both monolithic and composite Ni3Al, NiAl, and Nb5Si3. The effects of 10 volume percent TiB2 particulate/s3 on the fracture toughness of Ni3Al and NiAl were determined while in-situ monitoring of the fracture toughness tests was conducted with the aid of a deformation stage mounted inside a scanning electron microscope. The Nb5Si3 powders were produced via reaction synthesis followed by hot press consolidation and evaluation of fracture toughness on both the monolithic silicide as well as in-situ Nb5Si3/Nb composites. The Nb particles imparted significant toughening while both crack bridging and ductile phase toughening were observed in the in-situ fracture studies. Significant effects of loading rate on the resulting toughness was observed.

DESCRIPTORS: (U) *INTERMETALLIC COMPOUNDS, *SYNTHESIS(CHEMISTRY), ALUMINIDES, CRACKS, DEFORMATION, PARTICLES, POWDERS, PROCESSING, SCANNING ELECTRON MICROSCOPES, SILICIDES, TEST AND EVALUATION, TOUGHNESS, FRACTURE(MECHANICS), HIGH TEMPERATURE, PHYSICAL PROPERTIES, DUCTILITY, TOUGHNESS, REINFORCING MATERIALS, COMPOSITE MATERIALS, HOT PRESSING, NICKEL INTERMETALLICS.

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JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

IDENTIFIERS: (U) PE61102F, *Niobium silicides, Nickel
aluminides.

(U) Charge Transfer and Collision-Induced Dissociation
Reactions of CO++ With the Rare Gases at E lab = 49 eV,

JAN 93 11P

PERSONAL AUTHORS: Rogers, Steven A.; Price, Stephen D.;
Leone, Stephen R.

CONTRACT NO. F49620-92-J-0071

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-93-0159, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Chemical Physics, v88 n1 p280-
289, 1 Jan 93. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) Multiple product channels are observed for
the reaction of 13CO^{++} with each of the rare gases (Rg)
at $E_{\text{lab}} = 49 + \text{or} - 1 \text{ eV}$. A beam of 13CO^{++} is produced by
electron impact ionization and is mass selected using a
quadrupole mass spectrometer. The ion beam is focused
into a collision region and the reaction products are
monitored using time-of-flight mass spectrometry.
Relative yields for the production of $13\text{C}^+, \text{O}^+$, and 13CO^+
are measured directly. Absolute charge transfer reaction
cross sections for collisions of 13CO^{++} with He, Ne, Ar,
and Kr are estimated by comparing the Rg^+ production with
that for the charge transfer reactions of doubly charged
rare gas ions with neutral rare gas atoms. The cross
sections are found to range from $0.8\text{-}9.9 \times 10^{-15} \text{ A}^2$ for
collisions of 13CO^{++} with He to $37.5 + \text{or} - 19.8 \text{ A}^2$ for
collisions with Kr. The action of 13CO^{++} with He
proceeds almost exclusively into the collision-induced
dissociation channel. The branching fraction for
collision-induced dissociation is smaller for reactions
with Ne and almost disappears for Ar, Kr, and Xe. As the
relative importance of the collision-induced dissociation
process decreases, branching into the charge transfer
channel increases. The charge transfer reactions of

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13CO++ with Ar, Kr, and Xe are shown to populate excited, dissociative electronic states of 13CO+ selectively. These effects are modeled successfully using Landau-Zener theory in conjunction with reaction window theory.... Carbon monoxide, Charge transfer, Cross section, Dication, Ion, Rare gas.

DESCRIPTORS: (U) *CARBON MONOXIDE, *CHARGE TRANSFER, *DISSOCIATION, ATOMS, COLLISIONS, CROSS SECTIONS, ELECTRONIC STATES, ELECTRONS, IMPACT, ION BEAMS, IONIZATION, MASS SPECTROMETRY, RARE GASES, THEORY, REPRINTS, DIATOMIC MOLECULES, METASTABLE STATE, CATIONS, MOLECULAR PROPERTIES, KINETIC ENERGY, ELECTRON ENERGY.

IDENTIFIERS: (U) PE61102F, Reaction window theory.

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY
(U) Photochemical Hydrogen Abstraction by Aromatic Carbonyl Compounds in Zeolite Slurries.

DESCRIPTIVE NOTE: Scientific rept. 1991-1992.

92 5P

PERSONAL AUTHORS: Lei, Xuegon; Turro, Nicholas J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0153, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Photochemical and Photobiology Chemistry A, v89 p53-56 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Irradiation of solutions of aromatic aldehydes or ketones generally results in photoinduced hydrogen abstraction and yields mixtures of both asymmetric and symmetric coupling products of the radicals resulting from hydrogen abstraction. In contrast, irradiation of hydrocarbon-faujasite zeolite slurries of aromatic aldehydes or ketones results in production of radical pairs by intermolecular hydrogen abstraction, which is followed by the formation of good yields of the symmetric geminate coupling products. The mechanistic basis of this difference in chemoselectivity is proposed to result from a combination of strong preferential adsorption of the carbonyl compounds to the internal surface of the zeolite and inhibition of the diffusional motion of the geminate radical pair produced by photolysis by the 'spectator' hydrocarbon molecules that occupy the internal surface but which do not participate chemically in the reactions.... Zeolites, Slurries, Photochemistry, Hydrogen abstraction.

DESCRIPTORS: (U) *CARBONYL COMPOUNDS, *HYDROGEN, *SLURRIES, ADSORPTION, ALDEHYDES, CONTRAST, COUPLINGS.

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HYDROCARBONS, INHIBITION, INTERNAL, IRRADIATION, KETONES, MIXTURES, MOLECULES, MOTION, PHOTOCHEMICAL REACTIONS, PHOTOLYSIS, PRODUCTION, SURFACES, REPRINTS, AROMATIC COMPOUNDS, CHEMICAL RADICALS, DIFFUSION, ORGANIC CHEMISTRY, METHYL RADICALS, EXCITATION, FREE RADICALS, MOLECULAR STATES.

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Reactions of Electronically Excited Boron Atoms: Quenching Rate Constants and the Radiative Lifetime of the 4p 2p State,

DEC 92 8P

IDENTIFIERS: (U) PE61102F, *Zeolites, Abstraction, Faujasite, Asymmetric Geminate, Singlet state.

PERSONAL AUTHORS: Yang, Xuefeng; Dagdigan, Paul J.

CONTRACT NO. AFOSR-81-0363

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-83-0147, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v200 n3 p217-223, 4 Dec 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Collisional quenching and radiative decay of the 4p 2p level of the boron atom has been studied in a cell experiment, in which B atoms are prepared by 266 nm multiphoton dissociation of BBr₃ and the 4p 2p level is prepared by sequential 2-photon absorption through the 3s 2S level. A radiative lifetime of 380 ± 50 ns is derived for B(4p 2p) by extrapolation of the measured decay rates vs. BBr₃ partial pressure in several Torr helium buffer gas. Bimolecular quenching rate constants were also determined for a number of atomic and molecular species from the dependence of the B(4p 2p) decay rate on the quencher gas partial pressure. The quenching rate constants for the molecular species were quite large (ca. 1-2 X 10¹⁰ to the minus 9th power molecule⁻¹ cm³ s⁻¹), presumably reflecting the small B(4p 2p) ionization potential and the rapid removal of the excited state by chemical reaction.... Boron, Excited atoms, Collisional quenching.

DESCRIPTORS: (U) *BORON, *CHEMICAL REACTIONS, *ELECTRONIC STATES, ABSORPTION, ATOMS, BUFFERS, DECAY, DISSOCIATION, EXTRAPOLATION, HELIUM, IONIZATION POTENTIALS, MOLECULES, PARTIAL PRESSURE, PHOTONS.

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QUENCHING, REPRINTS, PARTICLE COLLISIONS, EXCITATION,
GROUND STATE, CHEMICAL BONDS.

IDENTIFIERS: (U) PE81102F, Electronic configuration,
Rydberg States.

AD-A262 318 20/5

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Photoionization Electronic Spectroscopy of AlOH,

JAN 93 7P

PERSONAL AUTHORS: Pilgrim, J. S.; Robbins, D. L.; Duncan,
M. A.

CONTRACT NO. AFOSR-91-0001

PROJECT NO. 2303

TASK NO. AS

MONITOR: AFOSR, XC
TR-83-0150, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v202 n3.4
p203-208, 22 Jan 93. Available only to DTIC users. No
copies furnished by NTIS.

ABSTRACT: (U) An electronic spectrum is observed for
AlOH formed in a laser vaporization pulsed molecular beam
source. The spectrum is detected near 250 nm by resonant
two-photon ionization spectroscopy. Two electronic states
are observed, spaced by only 1874 cm(1). Vibrational
progressions are observed in both states corresponding to
the excited state AlOH stretching mode ($\omega_e = 825$
cm(1)) and the Al-O-H bending mode ($\omega_e = 854$ cm(1)).
The spectrum is consistent with a quasi-linear ground
state and a more strongly bent excited state, as
predicted by theory... Clusters, Electronic spectroscopy,
Photodissociation.

DESCRIPTORS: (U) *PHOTOIONIZATION, *ELECTRON
SPECTROSCOPY, BENDING, ELECTRONIC STATES, GROUND STATE,
IONIZATION, LASERS, MOLECULAR BEAMS, PHOTODISSOCIATION,
PHOTONS, THEORY, VAPORIZATION, REPRINTS, COVALENT BONDS.

IDENTIFIERS: (U) PE81102F, *Aluminum monohydroxide,
Ionic bonds, Rotational spectra.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF EARTH
ATMOSPHERIC AND PLANETARY SCIENCES

(U) GPS Measurements at Vandenberg, AFB.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 91-14 Oct
92,

FEB 93 15P

PERSONAL AUTHORS: King, Robert

CONTRACT NO. AFOSR-90-0339

MONITOR: AFOSR, XC
TR-93-0184, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent geological and geodetic studies have suggested that the region surrounding Vandenberg AFB is undergoing active crustal deformation, with important implications for both the geodetic stability and the seismogenic potential of the Western Test Range (WTR) (Feigl et al., 1990). Part of the evidence for significant deformation was obtained from GPS measurements over a broad area of central and southern California, which we carried out in cooperation with other university and government scientists from 1987 through 1991. Although useful in defining the regional tectonic setting, these measurements are of insufficient spatial and temporal density to answer many important questions about the seismogenic potential of Vandenberg. The sites observed in the March 1992 survey are given in Table 1, and a map of the enlarged network is shown in Figure 1. Four new sites (CASM, FAARF, RDRK, and FIGP) were established on or bridging three of the four major anticlines that cut the Santa Maria Basin. Our primary scientific goal is to localize the measured deformation on one or more of these structures. One of the new sites (SOAP) provides a more stable anchor for that part of our network south of the Santa Ynez River Fault. Three other sites occupied for the first time (ARG3, VINA, VANP), as well as two previously occupied (ALVA, VNDN), are existing DMA sites near the south Base PGA site (VNDP). This small sub-network provides a means to monitor the local stability of the three sites (VAND, VNDN, and VNDP) that have been or will be used for long-term monitoring of deformation.

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The two-day occupation of the South Base sub-network also provided us the opportunity to study more carefully the effects of atmospheric water vapor on GPS measurements.

DESCRIPTORS: (U) *GEODETIC SURVEYS, *GLOBAL POSITIONING SYSTEM, ANCHORS, ATMOSPHERICS, CALIFORNIA, COOPERATION, DEFORMATION, DENSITY, FAULTS, MAPS, MEASUREMENT, MONITORING, MONITORS, NETWORKS, REGIONS, RIVERS, SCIENTISTS, SITES, SOAPS, STABILITY, STRUCTURES, SURVEYS, TECTONICS, TEST AND EVALUATION, TIME, UNIVERSITIES, WATER VAPOR, SEISMOLOGY.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2309AS.

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ILLINOIS UNIV AT URBANA

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) An Integrated Environment for the Development of Scientific and Engineering Applications.

(U) Filtering, Statistical Signal Processing and Variational Problems.

DESCRIPTIVE NOTE: Final rept 1 Dec 89-30 Nov 92.

DESCRIPTIVE NOTE: Final rept. 15 Jan 89-14 Oct 92.

82 31P

FEB 93 26P

PERSONAL AUTHORS: Kuck, David J.

PERSONAL AUTHORS: Mitter, Sanjoy

CONTRACT NO. AFOSR-90-0044

PROJECT NO. 2304

PROJECT NO. 3484

TASK NO. A6

TASK NO. MS

MONITOR: AFOSR, XC
TR-93-0186, AFOSR

MONITOR: AFOSR, XC
TR-93-0173, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) A new environment has been provided to assist in the programming of high performance parallel and vector computers. The environment consists of a unified set of programming tools such as restructuring compilers, parallel debugger, performance evaluation tools, and data visualization tools. This design takes into consideration the entire process of scientific/engineering project development.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *COMPUTERS, COMPILERS, TOOLS, DEBUGGING (COMPUTERS), DATA PROCESSING, PARALLEL PROCESSORS, COMPUTER LOGIC, SOFTWARE ENGINEERING.

IDENTIFIERS: (U) WUAFOSR2484MS.

ABSTRACT: (U) During the grant period the PI made major contributions in three principal areas: (1) Robust Kalman filtering. (2) Structure determination for X-ray crystallography and (3) Stochastic recursive algorithms for global optimization. These theoretical advances have wide applications in diverse problems, such as identification of systems using maximum likelihood techniques, filtering in the presence of non-Gaussian observation noise, outlier detection, image analysis, and phase estimation problems.

DESCRIPTORS: (U) *MATHEMATICAL FILTERS, *VARIATIONAL PRINCIPLES, ALGORITHMS, CRYSTALLOGRAPHY, DETECTION, FILTRATION, GLOBAL, IDENTIFICATION, IMAGES, KALMAN FILTERING, NOISE, OBSERVATION, OPTIMIZATION, PHASE, X RAYS, PROBLEM SOLVING, MAXIMUM LIKELIHOOD ESTIMATION, SIGNAL PROCESSING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304AB.

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NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

INDIANA UNIV-PURDUE UNIV AT COLUMBUS DEPT OF BIOLOGY

(U) Solar Flare MHD.

(U) The Molecular Anatomy of PFDA Hepatotoxicity as Studied by Two-Dimensional Electrophoresis.

DESCRIPTIVE NOTE: Annual rept. 2 Jan-31 Dec 92.

DESCRIPTIVE NOTE: Final rept. 15 Dec 89-14 Dec 92.

FEB 93 8P

FEB 93 24P

PERSONAL AUTHORS: Strauss, H.; Hamelri, E.

PERSONAL AUTHORS: Witzmann, Frank A.

CONTRACT NO. AFOSR-91-0044

CONTRACT NO. AFOSR-90-0128

PROJECT NO. 2304, 2311

PROJECT NO. 2312

TASK NO. CS, AS

TASK NO. A5

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0182, AFOSR

TR-93-0179, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT. (U) A new finite element time dependent, two dimensional magnetofluid code has been written. This code offers the possibility of localized mesh refinement to capture the development of current sheets, analogous to shocks by hydrodynamics. The finite difference MHD code was improved during the past year. The code is now robust, fast and user friendly. Fast driven magnetic reconnection has been simulated in three dimensions and the reconnection time scale is consistent with one logarithmic in the plasma resistivity. A model has been found where a spontaneous discontinuous magnetic field develops from a continuous initial state, which phenomenon is believed to occur in the solar corona. Several theories of MHD and resistive MHD instabilities in the solar corona have been developed.

DESCRIPTORS: (U) *SOLAR CORONA, *MAGNETOHYDRODYNAMICS, *SOLAR FLARES, HYDRODYNAMICS, MAGNETIC FIELDS, MESH, MODELS, TWO DIMENSIONAL, USER FRIENDLY, FINITE ELEMENT ANALYSIS, PLASMAS(PH:SICS), MAGNETIC FIELDS, COMPUTER PROGRAMS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304CS, WUAFOSR2311AS.

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ABSTRACT: (U) Perfluoro-n-decanoic acid (PFDA) effects on protein expression in the rat liver were studied in rodents following in vivo exposure to PFDA levels above, below and at the LD-50. Two-dimensional whole-liver homogenate protein patterns were generated and compared to previous results. As before, numerous proteins were altered; some suppressed, some induced, but most were unaffected. In an effort to identify the altered proteins, further analysis of basic proteins by first-dimension NEPHGE revealed the induction of cytochrome P452 (lauric acid omega-oxidase) and enoyl-CoA hydratase. Induction of these and related enzymes confirms previously observed PFDA-induced peroxisome proliferation and lends strong support to the notion that PFDA blocks normal Beta-oxidation, causes fatty acid accumulation, and results in compensatory peroxisomal and mitochondrial omega- and Beta-oxidation. Continued identification of other altered proteins will be undertaken to add to the metabolic paths affected by PFDA to further delineate its toxic mechanism. Rat liver, Perfluoro-n-decanoic acid, Hepatotoxicity, Two-dimensional electrophoresis, Peroxisome proliferation, Image analysis.

DESCRIPTORS: (U) *ELECTROPHORESIS, *LIVER, ACCUMULATION, ENZYMES, FATTY ACIDS, IMAGES, OXIDATION, OXIDOREDUCTASES, TOXIC AGENTS, PATTERNS, PROTEINS, RATS, TWO DIMENSIONAL

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ANATOMY, METABOLISM, MOLECULES, TOXICITY.

RICE UNIV HOUSTON TX DEPT OF MATHEMATICAL SCIENCES

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, *Perfluoro N
decanic acid, *Two dimensional electrophoresis,
*Hepatotoxicity.

(U) Integrated Approaches to Parallelism in Optimization
and Solution of Inverse Problems.

DESCRIPTIVE NOTE: Final rept. 15 May 89-31 Mar 92.

JAN 93 3P

PERSONAL AUTHORS: Symes, William

CONTRACT NO. AFOSR-89-0363

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0186, AFOSR

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Mathematical models for mechanical design problems and development of analytical and numerical tools for their solution was studied under this grant. The mathematical problems separate into ones of rods and membranes. Regarding the former, with M. Overton, the PI provided the first rigorous study of the shape of the strongest rod. In particular, within the context of the Euler-Bernoulli model, we established existence, necessary conditions, regularity, and a general, though efficient, means of computing an optimal shape. Previous studies had not fully dealt with the fact that the strength of a rod (the axial load under which it commences to buckle) need not be a differentiable function of its shape. The Mathematical Intelligence solicited an expository account of this work. This article was picked up by Discover magazine, where the review appears. Engineers in off-shore oil rig design at Exxon Production Research in Houston have approached the PI regarding the research. Via the rolling of thin plates they have the means to create rods with piecewise conical cross-sections. With J. Maddocks the PI has extended all of the above analytical findings to a much richer class of rods. In particular, they are able to accommodate hyperelastic rods with nonlinear bending laws and vanishing cross-

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sections in both the interior and at the boundary. In this new framework, they are also finally able to carefully pose and settle the bifurcation question as to whether the branch(es) of equilibria stemming from the buckling load of the optimal column are indeed supercritical, i.e., rightward.

DESCRIPTORS: (U) *BUCKLING, *CROSS SECTIONS, *MATHEMATICAL MODELS, *MEMBRANES, *RODS, *SHAPE, AXIAL LOADS, BENDING, BOUNDARIES, PLATES, PRODUCTION, EULER ANGLES, BIFURCATION(MATHEMATICS).

IDENTIFIERS: (U) Euler Bernoulli model, Hyperelastic rods, Nonlinear bending laws, Mechanical design.

ADTECH SYSTEMS RESEARCH INC DAYTON OH

(U) Enhanced Chromophore Polymeric NLO Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 92.

JAN 93 8P

PERSONAL AUTHORS: Sonl. Som

CONTRACT NO. F49820-92-C-0032

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-93-0169, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nonlinear optical (NLO) materials are an important component of many prospective Air Force applications including optical signal processing (switches, modulators, and guided-wave devices), and new laser sources (optical parametric oscillators and harmonic generators). Considerable progress has been made in the synthesis of frequency doubling (second harmonic generation - SHG) NLO chromophores and of polymeric materials containing such chromophores. A number of these SHG-NLO materials show noteworthy promise in small-scale characterizations. Commercialization of any of them requires that significant quantities of the materials, of demonstrable purity and stability, be readily available on a routine basis to these researchers who determine processing conditions as well as device manufactures.

DESCRIPTORS: (U) *CHROMOPHORES, *NONLINEAR OPTICS, *OPTICAL MATERIALS, AIR FORCE, FREQUENCY, HARMONIC GENERATORS, LASERS, MODULATORS, OSCILLATORS, PURITY, SECOND HARMONIC GENERATION, SIGNAL PROCESSING, STABILITY, SWITCHES, SYNTHESIS, POLYMERS, NITROBENZENES, FLUORINE.

IDENTIFIERS: (U) PE85502F, SBIR, Guided-wave devices, Prolinol, p-fluoronitrobenzene, NPPOH.

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) The Cage Effect in the Photolysis of (S)-(+)-Alpha-Methoxybenzoin: Can Triplet Radical Pairs Undergo Geminate Recombination in Nonviscous Homogeneous Solution?

DESCRIPTIVE NOTE: Scientific rept.,

JAN 93

8P

PERSONAL AUTHORS: Step, E. N.; Buchachenko, A. L.; Turro, N. J.

CONTRACT NO. AFOSR-81-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-93-0152, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Organic Chemistry, v57 p7018-7024 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photolysis of (S)-(+)-alpha-methoxybenzoin ((S)-(+)-MDB) in benzene at room temperature causes a small decrease in enantiomeric purity of the starting ketone recovered after photolysis. The photoracemization of (S)-(+)-MDB, measured by circular dichroism (CD), can be related to the geminate recombination probability, P_{eta} of benzoyl/sec-phenethyl triplet radical pairs (RP) formed during photolysis. The probability, P_{eta} is determined from chemical yields of the products only; it is not a quantum yield and does not require the measurement of photon intensity. The experimental value of P_{eta} is found to be ca. 0.04. The racemization of (S)-(+)-MDB in a partially converted sample can be completely suppressed by the addition of relatively low concentrations of radical scavengers such as dodecanethiol and a stable nitroxide radical (TEMPO). Since, at low concentrations employed, the scavengers effectively eliminate only free radicals, the absence of products of recombination of triplet benzoyl/sec-

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phenethyl RP under conditions of complete scavenging is consistent with the absence of geminate cage recombination of this RP. The observed value of ca. 0.04 for P_{eta} in the absence of scavenger results from the combination of radicals which have made diffusive excursions out of the primary solvent cage, i.e., random radical pairs.... Radical pairs, Cage effect, Geminate recombination.

DESCRIPTORS: (U) *FREE RADICALS, *RECOMBINATION REACTIONS, *BENZOLIN, BENZENE, DICHOISM, INTENSITY, KETONES, PHOTOLYSIS, PHOTONS, PROBABILITY, PURITY, ROOM TEMPERATURE, SOLVENTS, TEMPERATURE, REPRINTS, ORGANIC RADICALS, CHEMICAL REACTIONS, CHEMICAL DISSOCIATION.

IDENTIFIERS: (U) PE81102F, Benzoin/(S)-(+)-alpha-methoxy, Cage effect, Geminate recombination, Photoracemization, Magnetic polarization.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1982). High School Apprenticeship Program (HSAP) Reports. Volume 16. Arnold Engineering Development Center Civil Engineering Laboratory.

(U) Summer Research Program (1992). High School Apprenticeship Program (HSAP) Reports. Volume 15. Wright Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92,

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92,

DEC 92 227P

DEC 92 624P

PERSONAL AUTHORS: Moore, Gary

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0128, AFOSR

MONITOR: AFOSR, XC
TR-93-0125, AFOSR

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: See also Volume 1, AD-A261 988.

SUPPLEMENTARY NOTE: See also Volume 18, AD-A262 024.

ABSTRACT: (U) The following reports were completed during the Air Force 1982 Summer Research Program: Graphics Library Routines for EIT Analysts Software; Visualization of Quantum Chemical Calculations for Molecules; Development of a Versatile Spreadsheet for Estimating Electrical Power and Operating Hours for AEDC's Tunnel 18T; Calibration and Application of a Spectrapro(Trademarc)-275 Spectrometer; A Study of the Continuous Monitoring Station at Arnold Engineering Development Center; Comparison of the HNU 311 Portable and Hewlett Packard 5890 Series II Gas Chromatographs.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, GAS CHROMATOGRAPHY, MONITORING, SPECTROMETERS, ELECTRIC POWER, QUANTUM CHEMISTRY, COMPUTER GRAPHICS.

ABSTRACT: (U) The following reports were completed in the Air Force 1992 Summer Apprenticeship program at the Wright Laboratory. An Investigation of the APTAS System; Evaluation of Hydrocode Strain Contours by Microhardness testing; A study of the C and BASIC Computer Languages as well as an In Depth Discussion of Certain Mathematical Concepts; Electrical Analysis of Y8a2Cu307-x Superconducting Thin Films and Bulk Samples; Computer Resources: Examining the Workings of a Computer Network; Forced Liquid Cooling of a Non-Flush Simulated Electronic Chip; Using Mathematical Concepts to Produce Three Dimensional Computer Graphics; Image Analysis: A Fractal Application; Analysis of Fractal Image Compression and Decompression; Video Documentation of the Patran to Epic Link; Construction and Design of a Regulated Power Supply; Preparing High Tech Aircraft for Testing, Using Computer Applications; The Creation of a Graphics Workstation; A Comparison of Concept Recognition Skills; Characterization and Analysis of 1,3,5,5-Tetranitrohexahydropyrimidine; A Study of the Importance of Sled Tests to Crew Escape Engineers.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, IMAGES, COMPUTER GRAPHICS, CHIPS(ELECTRONICS), COMPUTER NETWORKS, THIN FILMS, PROGRAMMING LANGUAGES, MICROHARDNESS, SLED

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20/2 17/8

TESTS, ORGANIC CHEMISTRY, WORK STATIONS, POWER SUPPLIES,
VIDEO RECORDING.

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1982). High School
Apprenticeship Program (HSAP) Reports. Volume 14. Rome
Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 81-31 Aug 82.

DEC 82 215P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-83-0124, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 15, AD-A262 023.

ABSTRACT: (U) The following papers (apprenticeship reports) were completed during the 1992 Rome Laboratory summer session by high school participants: Effectiveness of Advanced Identification System and Lecroy Digitizers; Solid Modeling Using Network 11.5; The Influence of Modulation on Spectral Purity of Laser Emission; Analysis of F-16 Shielding Effectiveness; The Testing of Various Optical Logic Devices; Understanding C and UNIX Networks; Study of Crystals; Study of Crystal Growth; Programming of the C3 Backup Utility; Is Multi-Media the Answer?; Artificial Neural Systems; A Multi-Media Environment: Is It For Everyone?; Study of Parallel Distributed Processing; The Research of Different Samples Using the Scanning Electron Microscope; Laser Diode Array Testing; Advanced Radar Correlation Algorithms; Running Solid Models; Noise Measurement of Interconnecting Coaxial Cable.

DESCRIPTORS: (U) AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, RADAR CORRELATION, AIR FORCE RESEARCH, SCANNING ELECTRON MICROSCOPES, PARALLEL PROCESSING, NEURAL NETS, CRYSTALS, COMPUTER NETWORKS, ELECTROMAGNETIC SHIELDING, LASER MODULATORS, IDENTIFICATION SYSTEMS, APPRENTICESHIP, AIR FORCE RESEARCH, NOISE (ELECTRICAL AND ELECTROMAGNETIC).

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I55F

AD-A262 022 CONTINUED

IDENTIFIERS: (U) Optical logic, Laser diode array.

AD-A262 021 4/2 9/5 12/5 12/9
17/5

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1982). High School
Apprenticeship Program (HSAP) Reports. Volume 13.
Phillips Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 285P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49820-90-C-0078

MONITOR: AFOSR, XC
TR-93-0123, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 14, AD-A262 022.

ABSTRACT: (U) The following reports were among those completed during the Air Force 1992 Apprenticeship Program: The Development of Multi-Dimensional Fourier Transform to Be Used to Predict the Light Scattering Off an Optic; Programming Bar Code Readers for Inventory Purposes using the Interactive Reader Language; High Resolution Statistical Models for Prediction of Cloud Cover; Exploring Electromagnetic Effects; Fuzzy-C Optical Tracker; Thermal Control Using Scrapers in a Rotating-Disk, Wetted-Wall Chemical Reactor.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, CHEMICAL ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, CHEMICAL REACTORS, BEAMS(ELECTROMAGNETIC), OPTICAL TRACKING, CLOUD COVER, INVENTORY, BAR CODES, LIGHT SCATTERING.

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AD-A262 021

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RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). High School Apprenticeship Program (HSAP) Reports. Volume 12. Armstrong Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 81-31 Aug 92.

DEC 92 445P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0122, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 13, AD-A262 021.

ABSTRACT: (U) The following reports were among those completed during the Air Force 1992 Apprenticeship program: Cross Over Point for the Panasonic UD-718 Thermoluminescent Dosimeter Reader; The Study of Gas Chromatography: Volatile Organics; Dermal Penetration of Dibromomethane; Pathology Laboratory Overview; Dietary Intake Patterns and Cardiac Evaluations of United States Air Force Pilots.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, PILOTS, PATHOLOGY, CHEMICAL AGENTS, GAS CHROMATOGRAPHY, LUMINESCENT DOSIMETERS.

AD-A262 020

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RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). Graduate Student Research Program (GSRP) Reports. Volume 11. Arnold Engineering Development Center, Civil Engineering Laboratory, Frank J. Seiler Research Laboratory, Wilford Hall Medical Center.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 213P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-80-C-0078

MONITOR: AFOSR, XC
TR-93-0121, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 12, AD-A262 020.

ABSTRACT: (U) The following reports were completed during the Summer 1992 Apprenticeship Program. Among the Topics were: Experiences using Model-Based Techniques for the Development of a Large Parallel Instrumentation System; An Overview of the Behavior of Aluminum in Solid Propellant Rocket Motor; Solid Particulate Dispersion in Turbulent Atmospheric Boundary Layers; CFD and Acoustic BEM Applied to the Modeling of the AEDC ASTF EGMS; A Multigraph Implementation of a Distributed Image Processing System; A Cell Averaged Approach to the Solution of Integral Conservation Laws; Analysis of Acoustic Oscillations in Cavities with Spoiler Attachments; Numerical Modeling of Mixing and Reacting Flowfields; Multidimensional Conjugated Heat Transfer Analysis of the Arnold Engineering Development Center Heat-H1 Test Unit Nozzle.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, OSCILLATION, CONSERVATION, IMAGE PROCESSING, COMPUTER AIDED DESIGN, TURBULENT BOUNDARY LAYER, ALUMINUM, MEASURING INSTRUMENTS, HEAT TRANSFER, FLOW FIELDS.

AD-A262 019

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

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(U) Summer Research Program (1982). Graduate Student Research Program (GSRP) Reports. Volume 10. Wright Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 410P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0120, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 11, AD-A262 019.

ABSTRACT: (U) The following research reports were completed during the summer 1992 apprenticeship program. Among topics were: Point Spread Function Characterization of a Scophony Infrared Scene Projector; Fraction on the Mechanics of a Layer Composite; Velocity and Temperature Measurements in a High Swirl Dump Combustor; Development of an Enhanced Post Run Data Analysis Program for the Integrated Electromagnetic System Simulator; Hard Target Code Assessment and a Qualitative Study of Slide Line Effects in EPIC Hydrocode; Laser Imaging and Ranging (LIMAR) Processing; Neural On-Line Learning in Missile Guidance; Optimal Detection of Targets in Clutter Using an Ultra-Wideband Fully-Polarimetric SAR; Effects on Intensity Thresholding on the Power Spectrum of Laser Speckle; Using X Windows to Display Experimental Data; VLSI Synthesis Guiding Techniques using the SOAR Artificial Intelligence Architecture.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, GUIDANCE COMPUTERS, LASERS, ELECTROMAGNETIC PULSES, COMBUSTION, SIMULATORS, CARBON CARBON COMPOSITES, INFRARED PHOTOGRAPHY, ARTIFICIAL INTELLIGENCE, TARGET DETECTION.

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(U) Summer Research Program (1982). Graduate Student Research Program (GSRP) Reports. Volume 9. Rome Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 137P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0119, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 10, AD-A262 018.

ABSTRACT: (U) The following reports were completed during the 1992 Air Force Summer Program: Photonic Transversal Filtering of Microwave Systems; Implementation of the ITT Multiple Parameter Speaker Recognition Algorithm on the Sun Sparc; Mathematical Description, Computer Simulation and Analysis of a Pointing, Acquisition and Tracking System for Optical Intersatellite Crosslinks; Congestion Control for ATM Networks in a Tactical Theater Environment.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, COMPUTER NETWORKS, COMMUNICATION SATELLITES, NEURAL NETS, ACOUSTIC SIGNATURES, ACOUSTIC INTELLIGENCE, MICROWAVE FILTERS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A261 994 8/8 8/8 12/5 21/8.1 21/5 24/3

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 8. Arnold Engineering Development Center, Civil Engineering Laboratory, Frank J. Sailer Research Laboratory, Wilford Hall Medical Center.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 425P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49820-90-C-0076

MONITOR: AFOSR, XC
TR-83-0116, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 7, AD-A261 971.

ABSTRACT: (U) The following topics were among those completed at the Air Force Faculty Research Summer Program: Experiences using Model-Based Techniques for the Development of a Large Parallel Instrumentation System; Data Reduction of Laser Induced Fluorescence in Rocket Motor Exhausts; Feasibility of Wavelet Analysis for Plume Data Study; Characterization of Seagrass Meadows in St. Andrew (Crooked Island) Sound, Northern Gulf of Mexico; A Preliminary Study of the Weathering of Jet Fuels in Soil Monitored by SFE with GC Analysis; Preliminary Numerical model of Groundwater Flow at the MADE2 Site.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, WATER, OIL POLLUTION, VEGETATION, EXHAUST PLUMES, ROCKET EXHAUST, PARALLEL PROCESSING.

AD-A261 994

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AD-A261 993 12/8 18/1 20/13 17/5.1

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 5B. Wright Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 427P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49820-90-C-0076

MONITOR: AFOSR, XC
TR-83-0115, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 8, AD-A261 994.

ABSTRACT: (U) The following topics were among those completed during the Summer 1992 Apprenticeship program: Validation of a Hypersonic Nonequilibrium Code for Nozzle Flow; Motion Segmented Object Identification using 1-D Signal Analysis and a Heteroassociative Complex Neural Network; Analytical Guidance Laws and Integrated Guidance/Autopilot for Homing Missiles; Estimation of Aspect Angles of Targets in FLIR Images; Crack Arrest in Composite Plates Reinforced with Tough Layers; Some Results in Machine-Learning; Effect of Antioxidants on Thermal Decomposition of Energetic Materials.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, DECOMPOSITION, CRACK PROPAGATION, FORWARD LOOKING INFRARED SYSTEMS, GUIDED MISSILES, NEURAL NETS, NOZZLE GAS FLOW

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4155F

AD-A261 991 9/1 12/5 17/9 17/11

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 5A. Wright Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 483P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0114, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 5B, AD-A261 993.

ABSTRACT: (U) The purpose of this program is to develop the basis for continuing research of interest to the Air Force at the institution of the faculty member; to stimulate continuing relations among faculty members and professional peers in the Air Force to enhance the research interests and capabilities of scientific and engineering educators; and to provide follow-on funding for research of particular promise that was started at an Air Force laboratory under the Summer Faculty Research Program. During the summer of 1992 185 university faculty conducted research at Air Force laboratories for a period of 10 weeks. Each participant provided a report of their research, and these reports are consolidated into this annual report.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, EDUCATION.

AD-A261 992

UNCLASSIFIED

RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 4. Rome Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 246P

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0078

MONITOR: AFOSR, XC
TR-93-0113, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 5A, AD-A261 992.

ABSTRACT: (U) The following reports were a part of those completed during the Air Force 1992 Summer Research Program: Toward the Development of a Generalized Method and Code for Analyzing Infinite Arrays of Antennas Printed on Both Sides of Protruding Dielectric Substrates; Statistical Comparison of Several Automatic Target Recognition (ATR) Systems; Photonics Technology Development at Rome Laboratory; Atomistic Simulation of Grains in Submicron Aluminum Interconnects; Measurement of Thermophysical Properties of Semiconductors at High Temperature; Photonic Delay Line for High-Frequency Radar Systems; User-Based Requirements for Large-Scale Distributed Information Management Systems; Representation for System Designers; Flux Creep in a Y-Ba-Cu-O Film Characterized by a C-Axis Microstructure Imbedded with A-Axis Oriented Grains.

DESCRIPTORS: (U) *AIR FORCE, *AIR FORCE RESEARCH, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, THIN FILMS, INFORMATION PROCESSING, POLYFREQUENCY RADAR, SEMICONDUCTORS, PHOTONS, TARGET RECOGNITION, ANTENNA ARRAYS.

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RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

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(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 3. Phillips Laboratory.

(U) Summer Research Program (1992). Summer Faculty Research Program (SFRP) Reports. Volume 2. Armstrong Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

DEC 92 602P

DEC 92 711P

PERSONAL AUTHORS: Moore, Gary

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49820-90-C-0076

CONTRACT NO. F49820-90-C-0076

MONITOR: AFOSR, XC
TR-93-0112, AFOSR

MONITOR: AFOSR, XC
TR-93-0111, AFOSR

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: See also Volume 4, AD-A261 991.

SUPPLEMENTARY NOTE: See also Volume 3, AD-A261 990.

ABSTRACT: (U) The following reports were submitted during the 1992 Summer Faculty Research Program: Coherent Heterodyne Array Doppler Imaging; Calibration Techniques for a Low Energy X-Ray Irradiation Chamber; Ultrawideband Antennas with Low Dispersion; Optical Angle-Angle Doppler Imaging; Second-Harmonic Generation in Corona-Poled Materials.

ABSTRACT: (U) The following reports were completed during the Air Force Summer Faculty Research Program: Mathematical Modeling of the Human Cardiovascular System Under Acceleration; Analysis of the Arterial Blood Flow Using the Thick-Wall Model; An Intelligent Tutor for Sentence Combining; A Study of the Effects of Low Update Rate on Visual Displays; Development of a Research Paradigm to Study Collaboration in Multidisciplinary Design Teams; Intelligent Decision Making with Qualitative Reasoning.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, ELECTRICAL CORONA, BROADBAND ANTENNAS, IRRADIATION, BULKHEADS, DOPPLER SYSTEMS.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, DECISION MAKING, TEAMS(PERSONNEL), DATA DISPLAYS, HUMAN BODY, COMPUTER APPLICATIONS, BLOOD CIRCULATION, AIR FORCE FACILITIES.

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RESEARCH AND DEVELOPMENT LABS CULVER CITY CA

(U) Summer Faculty Research Program (SFRP) (1992). Volume 1. Program Management Report.

(U) Summer Research Program (1992). Graduate Student Research Program (GSRP) Reports. Volume 8. Phillips Laboratory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92,

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92,

DEC 92 578P

DEC 92 271P

PERSONAL AUTHORS: Moore, Gary

PERSONAL AUTHORS: Moore, Gary

CONTRACT NO. F49620-90-C-0076

CONTRACT NO. F49620-90-C-0076

MONITOR: AFOSR, XC
TR-93-0110, AFOSR

MONITOR: AFOSR, XC
TR-93-0118, AFOSR

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SUPPLEMENTARY NOTE: See also Volume 2, AD-A261 989.

SUPPLEMENTARY NOTE: See also Volume 9, AD-A262 017.

ABSTRACT: (U) The following reports were submitted during the 1992 Air Force Summer Research program: Solar Detoxification of Contaminated Groundwater; Description of Weather Station and Its Datalogging Program; Computer Programs and Project Operations; Robotic Excavation; Lunar and Earth Based; HSAP Summer Apprenticeship Program.

ABSTRACT: (U) The following reports were completed during the Air Force 1992 Graduate Research Program: Experimental Investigation of Homogeneous and Heterogeneous Nucleation/Condensation Processes and Products in Coll; Ion-Molecule Reactions at High Temperatures; Optical and Atmospheric Turbulence; Lagrangian Formulation of Lages's Spin Dynamics; A Study of Coupled Oscillatory Neural Network Models; High Temperature Heat Pipe Modeling Under Low Power Heat Loads and Cryogenic Phase Change Material Devices in Space Applications.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, APPRENTICESHIP, NEGROES, PERSONNEL SELECTION, RECRUITING, STUDENTS, ROBOTICS, COMPUTER PROGRAMS, WEATHER STATIONS, WATER POLLUTION ABATEMENT, SOLAR ENERGY.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, CRYOGENICS, HEAT PIPES, NEURAL NETS, SPIN STATES, PROPULSION SYSTEMS, TURBULENCE, ION MOLECULE INTERACTIONS, CONDENSATION, NUCLEATION.

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YALE UNIV NEW HAVEN CT

(U) Summer Research Program (1992). Graduate Student.
Volume 7.

(U) Efficient Communication for Parallel Computing.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92,

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 Dec 92,

DEC 92 257P

JAN 93 19P

PERSONAL AUTHORS: Moore, Gary

PERSONAL AUTHORS: Shatt,

CONTRACT NO. F49620-90-C-0078

CONTRACT NO. AFOSR-89-0382

MONITOR: AFOSR, XC
TR-93-0117, AFOSR

PROJECT NO. 2304

TASK NO. A3

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-93-0088, AFOSR

SUPPLEMENTARY NOTE: See also Volume 8, AD-A261 972.

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this program is to develop the basis for continuing research of interest to the Air Force at the institution of the faculty member; to stimulate continuing relations among faculty members and professional peers in the Air Force to enhance the research interests and capabilities of scientific and engineering educators; and to provide the follow-on funding for research of particular promise that was started at an Air Force laboratory under the Summer Faculty Research Program. During the summer of 1992, 185 university faculty conducted research at Air Force laboratories for a period of 10 weeks. Each participant provided a report of their research, and these reports are consolidated into this annual report.

ABSTRACT: (U) The main accomplishments during this grant are in the area of routing algorithms for binary cube networks.

DESCRIPTORS: (U) *COMPUTER COMMUNICATIONS, *PARALLEL PROCESSING, ALGORITHMS, ROUTING, PIPELINES, BIBLIOGRAPHIES, COMPUTER NETWORKS, EFFICIENCY.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ENGINEERING, LABORATORIES, SUMMER, UNIVERSITIES, GRADUATES, EDUCATION.

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